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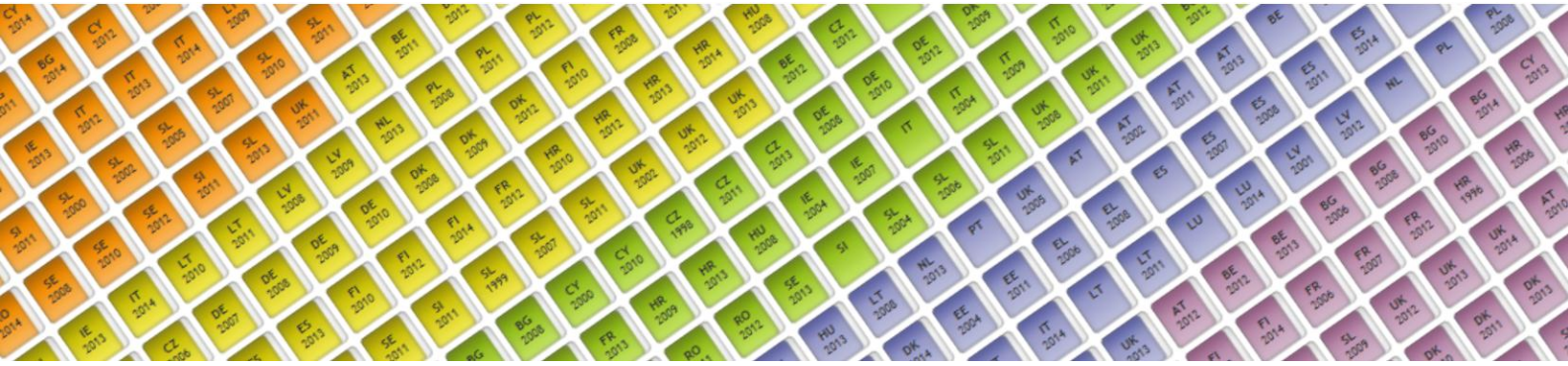

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Abstract

The report offers an analysis of the R&I system in Greece for 2014, including relevant policies and funding, with particular focus on topics critical for two EU policies: the European Research Area and the Innovation Union. The report was prepared according to a set of guidelines for collecting and analysing a range of materials, including policy documents, statistics, evaluation reports, websites etc. The report identifies the structural challenges of the Greek research and innovation system and assesses the match between the national priorities and those challenges, highlighting the latest policy developments, their dynamics and impact in the overall national context.

Acknowledgments

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Executive summary

Greece is a mid-sized country with a total population of 11m people, persistently a moderate innovator positioned low in all competitiveness rankings. Its economic situation is characterised by a contraction of almost 25% of per capita GDP during the crisis, currently at €17,400, i.e. 68.2% of EU-28 average. At the end of 2013, BERD was at €488.7m, representing 0.27% of GDP with a target set at 0.38% of GDP by 2020. In 2013 HEIs performed 37.4% of total GERD and RPOs (Research Performing Organisations) 28%; BERD was at 33.3% of GERD in 2013. In terms of funding the main source (52.3%) is the public sector. Competitive project funding is mainly funded by Structural Funds and FP support (13% of GERD) matched by the Public Investment Programme (PIP). The structure of the economy in terms of sectors and size of businesses (only two Greek companies among the 1000 top R&D spenders) explains to a large extent the constraints and vicious circles of the national innovation system. Recent statistics for turnover from innovation are lacking. R&D performance (publications, citations and FP participation) is better than innovation performance. Turnover from innovation accounted for 11.9% of total turnover (2012 data), compared to the EU-28 average of 11.8% and placed Greece in the 11th position along with the Netherlands among EU 28 Member States.

Governance is centralised and *stable in its instability*: Despite two recent laws and a restructuring plan, HEIs still have limited autonomy, excellence reward is not institutionalised but subject to the review process of project funding, which has been below 33% until 2013 and the General Secretariat for Research and Technology (GSRT) has the leading role in designing and implementing the national policy on R&D with limited coordination with investment and competitiveness policy making bodies. Laws and strategies aiming at improving the R&D system, modernising universities and harnessing externalities have been adopted for decades but the system remains almost unchanged with marginal changes only: truly evidence-based, coordinated policy is still not there.

In 2014 expectations for change are raised triggered by two major documents:

- The new and long awaited law on RTDI (consultation since 2012) was voted in November 2014 and foresees increasing focus on innovation and on regionalisation. The new RTDI Law also introduced new evaluation methods of research organisations.
- The Smart Specialisation Strategy (RIS3) at national and regional levels has been prepared and will form the basis for R&I policies in the coming programming period. A national strategy complements RIS3.

R&I support measures are numerous and follow to a large extent the Structural Funds cycle. Specific schemes are composed of long-standing simple grand schemes complemented increasingly by clustering incentives and financial engineering instruments (JEREMIE funds). Societal Challenges (Energy, Health and Environment, Agriculture) accounted for about 12% of GBAORD in 2012 and for almost 14% in 2013.

Efforts to comply with ERA priorities are mixed with a good response to incentives but limited good will to transform the labour market for researchers and rapidly modernise electronic infrastructure.

- Common research agendas are mainly driven by EU supported schemes as Greek teams participate extensively to ERAnets and other EU initiatives and often play an

important role in research agendas for grand challenges. However, ambitions are not raised and common ex post evaluation procedures are not implemented.

- With respect to the labour market of researchers, Greece has medium-low organisational autonomy and low financial, staffing and academic autonomy. Statistics for researchers in Greece are scarce and there is a discontinuity in reporting. At the end of 2011 (last available data), researchers accounted for about 0.92% of the active population compared to a EU28 average of 1.05%. Supply of skilled and medium-skilled labour increased more rapidly than demand in the decade 2000-2010 and it is expected to further increase more rapidly than demand in the current decade. However, as in many lagging Member States brains drain is a problem.
- Portability of national grants to other EU countries is not allowed. Access to grants is open to Greek and foreign candidates, provided that the research institution is established in Greece.
- New facilities and standards vary: Euraxess is active. The majority of Greek Higher Education Institutions (HEIs) have endorsed Chartered and Code (C&C) and 9 organisations were involved in the Commission's Human Resources Strategy for Researchers (HRS4R)
- Innovative Doctoral Training (IDT) is not formally implemented. Some PhD programmes follow the principles of IDT intuitively while others comply implicitly with some of the seven principles. The importance of PhDs in the private sector receives contradictory information and it is not a qualification always appreciated. A strong trend of emigration of researchers is observed during the crisis.
- Optimal circulation and access to scientific knowledge is good in terms of network speed and progressing mainly with small steps towards open access repositories but there is no national policy on e-identity or personal data security.

Framework conditions are not really favourable to R&I: autonomy is limited, the intervention of the state is often made with accounting rather than development criteria, the R&I policy cycle is not smooth with rationales, monitoring and evaluation suffering and financial incentives occasionally mismanaged in their delivery. Spin offs are a recent and limited phenomenon, although the legal provisions for IPR policies are systematic and institutionalised. Similarly the main issues that set the rules of collaboration are agreed and several efforts have been made and funding opportunities are offered for the creation of industrial liaison offices in universities and public research organisations. This has led to the creation of a market of intermediaries but no major change in open innovation or persistent collaborations. The VC market is small, almost exclusively funded by the JEREMIE initiative. Innovation driving demand-side policies are absent.

The performance of the national system suffers mainly from lack of business demand for new knowledge, and the lack of long term public funding of R&D; misalignment of supply and demand of human resources; poor governance of the national innovation system; existence of regional disparities in R&D and innovation performance. These challenges persist for decades and efforts to address them exist, but they are scattered with laws that are not implemented or are frequently changed prompting the system to revert to its traditional behaviour. High expectations are put into the 2014 R&I Law, RIS3 and the

response of the business sector to the crisis, where a large number of small initiatives are expected to bear fruit.

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1. Overview of the R&I system

1.1 Greece in the European RDI landscape

Greece is a mid-sized country with a total population of 11m people in 2013 accounting for 2.2% of EU-28 population. It ranks 10th in the EU, after Germany, France, Spain, Italy, United Kingdom, Poland, Romania, the Netherlands and Belgium.

At the end of 2012 (last available data), GDP per capita was at €17,400, 68.2% of EU-28 average, and has been experiencing a steady decrease from €20,700 in 2009, to €19,900 in 2010 and €18,700 in 2011[1]. Greece presented above EU-average growth before the crisis (2007), but has suffered a heavy uninterrupted recession since 2008; GDP is expected to grow by 2.9% in 2015 and 3.7% in 2016[2].

Greece ranks fifth from the bottom in terms of R&D intensity among all EU member states. At the end of 2013, GERD was at €1.47b, increasing from 0.67% of GDP in 2011 to 0.8% of GDP in 2013. The rise is, however, due more to the decreasing denominator than to a massive increasing of R&D spending.

The R&D intensity target is set at 1.21% of GDP by 2020 and in order to reach this target, BERD should increase from 0.21% of GDP in 2012 to 0.38% of GDP in 2020 and public funding from the Public Investment Programme (PIP) should increase from €50 m (0.03% of GDP) in 2014 to € 600 m by 2020 (0.27% of GDP)[3].

Turnover from innovation accounts for 11.9% of total turnover (2012 data), compared to the EU-28 average of 11.8% and places Greece in the 11th position among EU 28 Member States along with the Netherlands[4].

1.2 Main features of the R&I system

The system is dominated by public funding. The public sector funded about 50% of total GERD in the period 2011-2013, steadily increasing to 52.3% at the end of 2013. Industry-financed GERD accounted for 30.3%, HERD for 2.6%, private non-profit less than 1% and the rest of the funding (14%) came from abroad. Among EU-27, Greece ranked 7th in terms of number of applicants to FP7 programmes and 7th in terms of requested EC contribution[5]. In 2013, funding from abroad covered 14% of total R&D and was principally allocated to HEIs (39.7% of total) and public research organisations (30.2% of total).

The R&D system in Greece is centralised. The General Secretariat for Research and Technology (GSRT), part of the Ministry of Education and Religious Affairs has the leading role in designing and implementing the national policy on R&D. Limited research budget lines allocated to the regions were in the past transferred to the GSRT, which launched central calls and selects proposals complying with the budget lines transferred to each

[1] Eurostat, GDP (nama_gdp_c)
[2] Greek National Reforms Programme 2014, April 2014, pg.9
[3] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 13
[4] Eurostat- Turnover from Innovation as % of total turnover (tsdec340)
[5] European Commission, DG for Research and Innovation, Innovation Union Competitiveness report 2011, Country profile – Greece

region. This is, however, changing in the current programming period, as Regional Authorities have designed their own Smart Specialisation Strategies which will be implemented in the Regional Operational Programmes in parallel with competitive calls from the national Operational Programme for Competitiveness.

The new Law on Research Technological Development and Innovation (L.4310/2014), acknowledges the pivotal role of GSRT in the design of R&D programmes and the allocation of funding, but foresees also the creation of Regional Research and Innovation Councils (RRIC), which will have a major role to play in regional policies and cooperate with the GSRT in strategy formulation, networking, R&D collaborations and the development of HERD in the regions.

1.3 Structure of the national research and innovation system and its governance

The National Council for Research and Technology (NCRT) is the supreme State advisory body for formulating and implementing the national policy for research, technology and innovation[6]. It is composed of top Greek scientists within the country as well as Diaspora Greeks. NCRT proposes guidelines in the area of research and technology, assesses candidacies for directorship appointments in national research organisations, gives opinions to the Ministry of Education and Religious Affairs on the selection of directors in national research organisations, as well as on specific issues raised by the Ministry of Education and Religious Affairs. The supervising minister nominates the members of NCRT for a three-year period, with the last nominations awarded in 2014 While the NCRT is operating since the mid '80s there have been several attempts to upgrade its role in policy making but it remains focused on its advisory tasks.

The design and implementation of RTDI policy is carried out by GSRT, a policy design and implementation agency of the Ministry of Education and Religious Affairs. The responsibilities of GSRT include:

- The design of national R&I policies (policy design function)
- The implementation of measures of public funding of research and innovation (research council function)
- The funding and supervision of the main 14 public research organisations[7]
- The representation of the country in international research policy organisations, fora and bilateral agreements.

The Secretariat of Education and Life-Long Learning of the Ministry of Education and Religious Affairs designs and implements programmes for basic research and capacity building (Heraclitus II, Aristeia II, and PostDoc).

Other public organisations involved significantly in R&I governance include:

- The Ministry of Development and Competitiveness, through the Secretariats for Public Investments-NSRF and Industry, which traditionally supported

[6] http://www.gsrt.gr/central.aspx?sId=106|465|1173|646|438202, December 2014
[7] http://www.gsrt.gr/central.aspx?sId=120|438|1149|646|493483, http://www.gsrt.gr/central.aspx?sId=120|438|1148|646|493472, December 2014

entrepreneurship and intend to be more closely involved in funding innovation in the future;

- The Ministry of Agricultural Development supervising the National Agricultural Research Foundation (NAGREF), which undertakes research and technology in Greece in agricultural, forest, animal and fish production, the protection of crops, veterinary, management of marine resources, soil science, land improvement, processing and preservation of agricultural products, as well as agricultural economy and sociology. Its research activity is conducted by 8 RPOs in Thessaloniki;
- The Regional Councils in the 13 regions of the country, endowed with (limited) funds for their development. In the context of their 13 independent RIS3 strategies, all available funding of Regional Councils will be spent in their respective priority areas to reinforce regional R&I.

At the end of 2014, the Higher Education sector was composed of 22 public universities and 14 public Technological Education Institutes (TEI)[8]. Plan "Athena", went live in 2013 aiming to restructure HEIs all over the country, achieve economies of scale and adapt skills to the labour market. The plan was fully operational by April 2014, in compliance with the deadline set in the Memorandum of Understanding on Specific Economic Policy Conditionality[9].

The "Athena" reform did not have a significant impact on new intake of students since entries in 2013-2014 have shown only a 1.4% drop with respect to 2012-2013[10]. There are discussions on a potential reinforcement of streamlining educational establishments.

In addition to public there are 28 private universities of various types accredited by the Ministry of Education and Religious Affairs and operating in the country[11]. Half the universities in the country are multi-disciplinary; two are focusing on technology, one in agriculture, one in fine arts and three in economics and business studies. There is one "open university" which serves teaching needs for the whole country and an international university targeting mainly students from the Balkans and Mediterranean countries.

GSRT supervises 15 of these research centres of varying sizes[12]. They belong to two generations, those established before 1980 in order to support the public interest in nuclear energy, atmospheric and marine environment, social policies and agricultural modernisation, and those established after 1980, which aim at organising public research in parallel to universities, at the same time adopting effective management support and world quality standards.

In 2013 HEIs performed about 37.5% of GERD, compared to 39.9% and 40.2% in 2012 and 2011, respectively. Public research centres perform about 28% of the research in Greece as measured by GERD (28% at the end of 2013) and their contribution to total GERD has increased by almost 5% in the period 2011-2013.

[8] http://el.wikipedia.org/wiki/Ανώτατα_εκπαιδευτικά_ιδρύματα_στην_Ελλάδα, December 2014
[9] The Second Economic Adjustment Programme for Greece Fourth Review – April 2014, European Economy, Occasional Papers 192, April 2014, pg. 101
[10] The Second Economic Adjustment Programme for Greece Fourth Review – April 2014, European Economy, Occasional Papers 192, April 2014, pg. 44
[11] http://hca.gr/συχνές-ερωτήσεις/επιλογή-κολλεγίου-συμβουλές-προς-υπο/, December 2014
[12] L.4310/2014 (Art. 13a)

GERD performed by the private non-profit sector is minimal and was at €18.3m at the end of 2013, steadily increasing from 2011 (€ 14 m).

BERD rebounded in 2013 and exceeded € 488 m, after a sharp fall to € 458.6m in 2012 (5.6% decrease from 2011). SMEs account for 99.9% of the total number of companies in Greece and contribute 85.2% to employment[13]. Very few multinational companies are involved in R&D in Greece, however there are no statistics. In 2014, a few multinationals of Greek origin moved or expressed their intention to transfer their headquarters to avoid problems associated with the country risk. Although there are no concrete data to support this statement, it is estimated that this relocation will decrease BERD conducted by the private sector.

Based on EU2014 Industrial R&D Investment Scoreboard, PHARMATHEN and INTRALOT are the only Greek companies that feature among the top 1,000 EU companies on R&D spending and the top 2,000 world companies.

2014 has been an active year in two respects:

- The new and long awaited law on RTDI (consultation since 2012) was voted in November 2014 and foresees increasing focus on innovation and on regionalisation. The new RTDI Law also introduced new evaluation methods of research organisations.
- The Smart Specialisation Strategy at national and regional levels has been prepared and will form the basis for R&I policies in the coming programming period.

In the last five years there is evidence that R&I policy is taking steps to modernise:

- A series of laws were introduced to re-organise universities, increase their autonomy and increase the efficiency of teaching and research. Two consecutive Laws adopted in 2008 and 2011 (the latter in consensus of the two major political parties) adopted the Bologna regulation, established a dual mode governance and, despite initial opposition, modernised student obligations abolishing the right of "permanent" students by stipulating an upper limit in study time (with transitional clauses), organising representations etc.
- Project Athena came after that to spatially and in disciplinary terms rationalise HEIs, but has not as yet met its targets, having given way to political and local lobbying pressures.
- A major problem is caused by the austerity budget that has significantly curtailed the institutional funding of HEIs, lowering faculty salaries, more than halving operational cost support and laying off more than 50% of administrative personnel in the major universities.
- The National Documentation Centre has become an active and strategic partner supporting evidence-based policy. As a consequence Greece has again for the first time after 8 years data on R&D, has conducted a CIS and there is an increasing number of publications referring to analyses of publications, citations, participation in EU supported projects etc.

[13] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 18

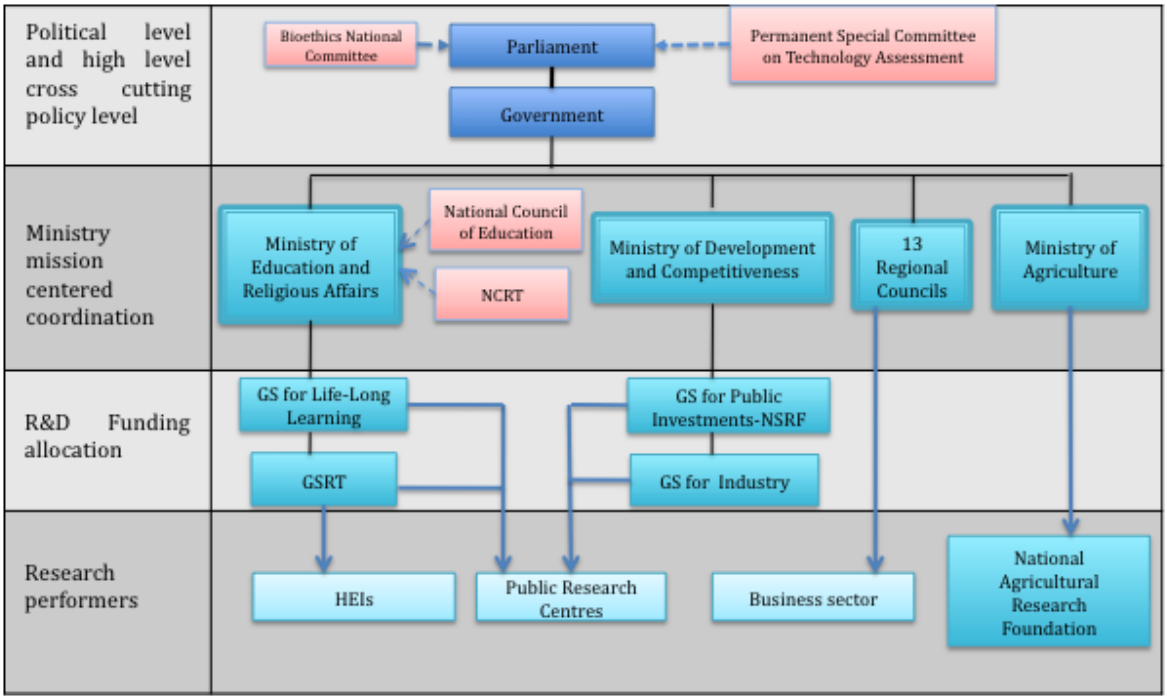
- The GSRT has for the first time in over a decade launched an evaluation study of its services and organisational mode, which is expected to feed into the policy design of the new programming period and increase its ambitions.

There were no other major R&D changes occurring in the period 2009-2014, except for the back and forth transfer of GSRT from the Ministry of Development, Competiveness, Infrastructure, Transport and Networks to the Ministry of Education and Religious Affairs. This transfer was proof of a lack of focus at policy level. The establishment of the Innovation Council at the end of 2013 was expected to enhance coordination and ensure better monitoring of innovation efforts by the Ministry of Development and Competitiveness. However, up till the end of 2014 there were no significant achievements and it was transformed to a National Council of Research and Innovation in revised RDI structure by Law 4310/2014.

In February 2015, the newly elected government created the position of an Alternate Minister of Education and Religious Affairs with a mandate on research and innovation. This is the first time (since the abolition of the Ministry of Technology in the '80s) that the country has given R&I such a prominent role reflecting a political priority.

Main changes in 2009
- *Supervision of GSRT changed from the Ministry of Ministry of Development, Competiveness, Infrastructure, Transport and Networks to the Ministry of Education and Religious Affairs*
Main Changes in 2010
- *Establishment of NCRT*
Main changes in 2011
- *Adoption of Law 4009/2011: Structure, operation, quality assurance of academic studies and internationalisation of HEIs introducing the Charter and Code and changes in the structure of HEIs*
Main changes in 2012
- *Supervision of GSRT changed from the Ministry of Education and Religious Affairs to the Ministry of Development, Competiveness, Infrastructure, Transport and Networks* - *Supervision of GSRT was transferred back to the Ministry of Education and Religious Affairs*
Main Changes in 2013
- *The Ministry of Development, Competiveness, Infrastructure, Transport and Networks was split into two independent ministries, namely the Ministry of Development and Competitiveness and the Ministry of Infrastructure, Transport and Networks. The management of the NSRF remained with the new Ministry of Development and Competitiveness* - *Establishment of Innovation Council* - *Publication of R&D metrics* - *Plan Athena was enforced* - *Adoption of Law 4115/2013 introducing provisions for the professional development of researchers*
Main Changes in 2014
- *New RTDI Law* - *Preparation of the new Smart Specialisation Strategy* - *Launch of GSRT Evaluation study*

Figure 1: Current RDI structure



2. Recent Developments in Research and Innovation Policy and systems

2.1 National economic and political context

In 2013, Greece started showing signs of economic stabilisation, following five years of severe austerity measures and about 25% decline (23.8%) of GDP per capita compared to 2008[14]. GDP decline decelerated from -6.0% year-on-year in the first quarter of 2013 to -2.3% in the last quarter of the year, marking an annual GDP contraction of 3.9% by year-end. In 2014, GDP is predicted to increase by 0.6%. A primary surplus of 3% of GDP is foreseen in 2015. GDP is estimated to grow by 2.9% in 2015 and 3.7% in 2016[15].

In April 2014, Greece returned to the international bond markets and raised €500 million with a three-year senior unsecured benchmark note at a yield of 5.13%. Investor demand from 25 countries, surpassed €3 billion, and the bond offering was 6 times oversubscribed[16].

The political situation has stabilised compared to 2012 (two successive elections), but is still at risk fuelled by the ongoing high taxes and active policies reducing the size of the public sector, prescribed in the on-going stability programme. In January 2015 there was a new elected government and economic instability is expected in the first quarter of 2015 as the new government is negotiating a new fiscal programme with IMF, EU and the ECB.

The structural and fiscal reforms of the recent years have improved the position of Greece worldwide in the period 2008-2013. More specific:

- Greece improved by 5 positions in the OECD "Product Market Regulation" indicator, while at the same time OECD ranked Greece as the country with the greatest responsiveness to its recommendations;
- Greece advanced by 97 positions in the World Bank (WB) indicator "starting a business", by 70 positions in WB indicator "protecting investors" and by 24 positions in the WB indicator "ease of doing business";
- Greece ranked first in 2013 in the "adjustment progress indicator" produced by the Lisbon Council & Berenberg Bank[17].

Still, in the Global Competitiveness Index (GCI) 2013-2014 of World Economic Forum, Greece ranks low in the 91st position (out of total 148)[18] compared to 67th position (out of total 134) in GCI 2008-2009[19]. Corruption is considered by 80% of Greeks as a barrier to business competition, according to the Special Eurobarometer on Corruption Survey (2013)[20].

Unemployment, the highest in the EU, remains above 27% but is expected to decrease by 0.6% in 2014 and by 2.6% in 2015[21]. Approximately two thirds of the unemployed have

[14] Hellenic Statistical Authority, provisional data for GDP/capita at market prices
[15] Greek National Reforms Programme 2014, April 2014, pg.9
[16] The Second Economic Adjustment Programme for Greece Fourth Review – April 2014, European Economy, Occasional Papers 192, April 2014, pg. 18
[17] Greek National Reforms Programme 2014, April 2014, pg. 3
[18] Global Competitiveness Report 2013-2014, World Economic Forum
[19] Global Competitiveness Report 2008-2009, World Economic Forum
[20] ANNEX GREECE to the EU Anti-Corruption Report, pg. 3
[21] The Second Economic Adjustment Programme for Greece Fourth Review – April 2014, European Economy,

been unemployed for over a year[22]. 34.6% of the population is classified by EUROSTAT (2012) as being at risk of poverty or social exclusion[23].

The overall economic strategy in the next programming period (2014-2020) will focus on activities that create jobs and attract new investments and more specific on:

- The enhancement of the competitiveness and export orientation of SMEs through the adoption of a new growth model. Priority will be given to the following sectors: Tourism (not only sun & beach, but also thematically specified tourism, such as nautical, cultural, medical, city breaks, conferences/exhibitions), Energy, Agro-Food (including aquaculture), Logistics, Health services including pharmaceuticals, care for the elderly people, Environmental Industry, ICT, Creative industries and culture;
- The development and utilisation of human resources and active social integration policies;
- The protection of the environment; and
- The development and expansion of the existing infrastructure (roads, energy networks)[24].

In addition, a Roadmap of Anti-Corruption was drafted in October 2012 by the European Commission Task Force on Greece proposing anti-corruption measures. Following this report, the government drafted an action plan for the period 2013-2015 in January 2013, appointed an anti-corruption coordinator and established a national anti-corruption committee by Law 4152/2013[25].

In a nutshell the long consolidation period has resulted in significant reductions of public and business spending, which affected i.a. R&I expenditure. Corruption is also affecting business competition but is expected to decrease following the adoption of measures in 2013. The recent destabilisation of the economy is expected to affect macro-economic indicators but hopefully R&D intensity increase from 0.69% to 1.21% of GDP by 2020[26], will be achieved.

2.2 National R&I strategies and policies

Coordination and networking of R&D has never been a strength of the Greek administration. Policy coordination takes place de facto through the Structural Fund planning process (Partnership Agreement and Operational Programmes). This process has been entrusted to the General Secretariat for Public Investments- which coordinates the various Management Authorities. This is a formal process, which ensures that there are no overlaps in the measures launched.

In the current RDI framework, networking of stakeholders takes place more on an ad hoc basis, when consultations are launched before adopting formal documents (laws, policy and strategy documents) or in the context of broad conferences and workshops.

Occasional Papers 192, April 2014, pg.14

[22] Greek National Reforms Programme 2014, April 2014, pg. 4

[23] Eurostat, People at risk of poverty or social exclusion by age and sex, last update 16.09.2014

[24] Greek National Reforms Programme 2014, April 2014, pg.20

[25] ANNEX GREECE to the EU Anti-Corruption Report, pg. 6-7

[26] Greek National Reforms Programme 2014, April 2014, pg. 49

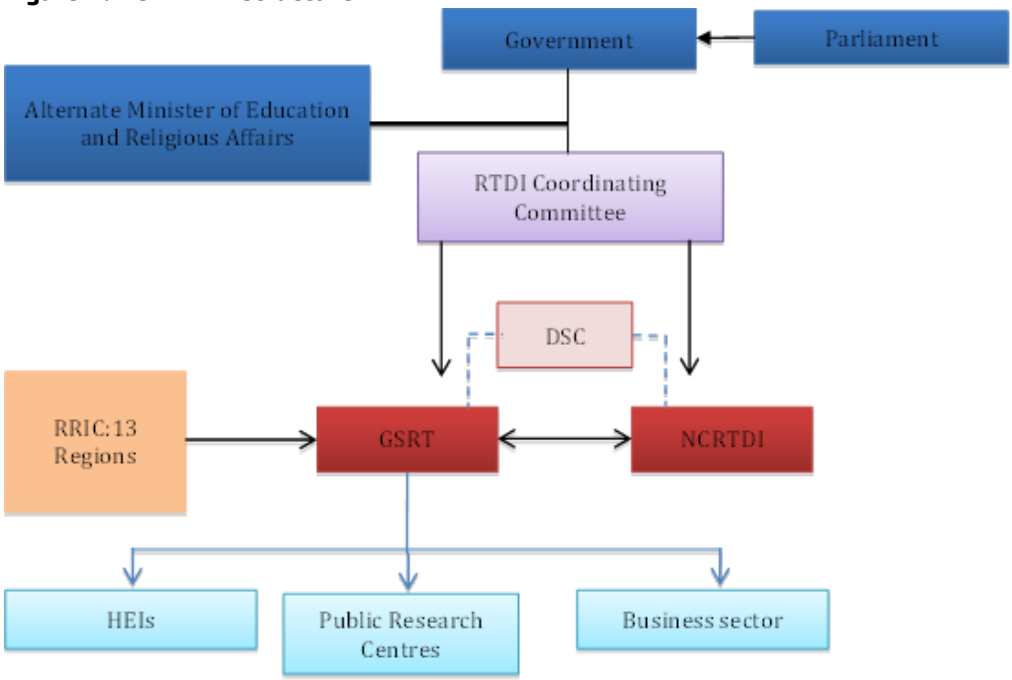
Two major governance changes are envisaged to improve coordination: One by the new National Strategy for Research, Technological Development and Innovation (ESETAK) for national coordination and one by the new Law on Research, Technological Development and Innovation (Law 4310/2014) regarding national-regional R&I coordination.

ESETAK, described below, introduced a modified governance scheme, aiming to improve public administration of R&D, established new advisory bodies and addressed the need for educational reforms and better funding mechanisms, tax incentives and rebates supportive of R&D.

The new RDI structure (Figure 2) sets up GSRT in a central role coordinating R&D activities of RPOs, HEIs, academia and the business sector. NCRT is renamed to National Council of Research, Technological Development and Innovation (NCRTDI). A RTDI Coordinating Committee between the government, GSRT and NCRTDI plays pivotal role in the coordination of all R&D government efforts. The Committee dictates general principles, thus allowing more independence to the respective bodies in the implementation of R&D decisions[27]. The law foresees also the support of GSRT by Regional Research and Innovation Councils (RRIC) established by decision of the Prefect and by Disciplinary Science Councils (DSC).

NCRTDI monitors national and international RTDI developments and submits appropriate recommendations to GSRT. It contributes to the design and updating of ESETAK. NCRTI also evaluates and exploits state aid rules for financial and non-financial activities, promotes international R&D collaborations and ensures close cooperation between HEIs, RPOs and the industry. The composition of NCRTDI includes 15 members appointed for a 4-year period; 2 out of which are appointed by the Minister of Education and Religious Affairs (Chairman, Vice-Chairman), 2 are appointed from RRIC, 2 are appointed from the industry and the remaining 9 members are hired following an open tender procedure of GSRT.

Figure 2: New RTDI structure



[27] National Strategic Framework for Research and Innovation 2014-2020, National Council of Research and Technology, pg. 17

GSRT designs and monitors the implementation of ESETAK, supervises and evaluates research organisations on a regular basis, ensures the implementation of ESETAK Action Plan and submits recommendations to the Minister of Education and Religious Affairs for the revision of the Action Plan. GSRT launches RTDI programmes, monitors and evaluates funding proposals, collects and assesses research data, assesses the implications of ESETAK policy (L.4310/2014-Art.8). GSRT is evaluated every three years by an independent committee appointed by the Minister of Education and Religious Affairs (L.4310/2014-Art.7).

RRIC will consist of 7 people (3 professors or researchers from regional research organisations and the remaining four members will come from local authorities, industries and enterprises with experience in the design and implementation of R&D programmes) with a term of 4 years, renewable only once.

GSRT and NCRTDI may be supported by Disciplinary Science Councils (DSC) with experience in Arts and Humanities, Agriculture-Nutrition-Food, Health and Biosciences, Engineering Sciences, Energy, Environment, Social Sciences, Mathematics and ICT, Natural Sciences.

The new elected government created the position of Alternate Minister of Education and Religious Affairs, entrusted with the monitoring of RTDI policy.

The R&I policy is planned for a period of seven years following the cycle of the European Structural Funds.

ESETAK will be implemented through an Action Plan, prescribed by the Minister of Education and Religious Affairs jointly with the Minister of Finance and the Minister of Development and Competitiveness. The Action Plan will be regularly revised.

EU Structural Funds are acknowledged as the primary source of R&D funding, with an emphasis on the increase of demand for research and innovation services from the corporate sector, the development of innovation (technological or not), the promotion of excellence in research and the funding of cutting edge technologies in accordance with the priorities set out in RIS3, the development of extroversion and synergies within the Greek research community[28]. A SWOT is prepared in the context of the preparation of ESETAK and it is expected to become publicly available together with the RIS3 at the end of March.

Based on the Action Plan for the implementation of ESETAK 2015-2021, September 2014, R&I strategy will be developed on three pillars[29]:

- Smart development based on knowledge and specialisation;
- Excellence in research and development of human resources in research and development (HERD); and
- Social challenges.

The Action Plan acknowledges the importance of the active participation of all stakeholders (expert opinions, EU, business, academia) for the implementation of the strategy through public consultations, foresight exercise and the Innovation Platforms developed by GSRT with the participation of businesses, HEIs, RPOs, Ministries and the Regions[30].

[28] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 12
[29] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 13
[30] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 15

The Greek National Reforms Programme 2014 called for an increased R&D spending, setting the R&D intensity target to 1.21% of GDP for 2020. This figure is over-ambitious, taking into account the historical development rate of R&D intensity. Although average annual R&D growth has accelerated in the period 2011-2012 (3.5%) compared to the period 2001-2007 (0.5%) average annual growth will need to reach 7.3% in the period 2012-2020 if the 2020 goal is to be achieved. This is about 2% higher than the corresponding EU average[31]. In addition, if all goes well, GDP is expected to grow rapidly to catch up for the long decline exercising additional pressure to obtain the R&D intensity target.

The Greek NRP 2014 emphasises the need for increased cooperation of Greek researchers with European researchers through European R&D programs (HORIZON 2020, COSME) and their participation in other transnational organisations (ESA, EMBO, CERN), Also, the NRP calls for coordination of national policies and the joint funding of R&D projects with other Member States. The reinforcement of the country's participation in the construction phase of the ESFRI research infrastructures, the signing of bilateral and multilateral agreements on R&D (ongoing), and the exploitation of synergies between Horizon 2020 and Structural Funds are also important[32].

Regarding important R&I policy initiatives (laws, regulations, support measures) that occurred recently, the following should be noted:

- The new RTDI Law was enforced;
- Law 4223/2013 introduced tax incentives on R&D expenses during the period in which they are realised and provided for their allocation in a 3-year period, in an effort to stimulate R&D investment amidst the financial crisis. The law also allowed deductions of R&D expenses of taxable income up to 30%;
- In December 2013, Law 4224/2013 created Innovation for Growth (IfG) for the financing of SMEs and infrastructure projects in Greece. Onassis Foundation also agreed to contribute €30m to the Fund;
- In April 2014, the Hellenic Federation of Enterprises (HFE) launched "Innovation Expert-Innovation in Action", a new initiative aiming to support innovation in Greek enterprises through networking and lectures (described in detail under chapter 4).
- In May 2014, INNOVATHENS was established, aiming to create an innovation network in Athens (described in detail under chapter 4);
- In September 2014, GSRT launched an invitation for Expression of Interest (EOI) for the provision of services for the creation of a web R&I platform. Submission deadline was in October 2014 and the project was foreseen for 3 months[33]. The establishment of a web R&D platform will enhance knowledge transfer between HEIs, RPOs and the business community;
- In October 2014, GSRT and the Hellenic Federation of Enterprises (HFE) signed a strategic partnership agreement for research, technology development and innovation (described in detail under Chapter 4).

[31] Europe 2020 targets Research and Development

[32] Greek National Reforms Programme 2014, April 2014, pg. 56

[33] http://www.gsrt.gr/central.aspx?sId=110I458I1163I646I453967&olID=777&neID=589&neTa=1_937&ncID=0&neHC=0&tbid=0&lrID=2&oldUIID=aI777I0I119I428I1089I0I3&actionID=load, December 2014

A decision by the Minister of Education and Religious Affairs to reduce the budgets of ARISTEIA, I, II, ERC and Thales by € 10 m in the context of budget savings has created a hefty reaction from the side of the NCRT and the scientific community, accusing the government of demonstrating an intolerable lack of focus on R&I, given the already very limited budget[34].

The above mentioned policy initiatives encompass research, innovation and education aspects. Investments in research infrastructures are not included in these policies and strategies but Greek NRP 2014 prioritises the participation in the construction of ESFRI research infrastructures.

The above mentioned initiatives reflect the need to enhance innovation in the country and to provide a better structure for the development of R&D activities through better monitoring and coordination and more incentives for higher R&D expenditure.

Frontier research is not explicitly mentioned but support in excellence may be seen asan indirect way to address it.

Key Research programmes in operation are[35]:

- Heraclitus II (2010-2015) for the support of doctorate scholarships (€ 39.6 million) with the aim of increasing the labour force of researchers
- Thales (2009-2015) for the support of research teams in Greek universities through the funding of interdisciplinary and inter-institutional research projects(€ 120 million)
- Archimedes III (2009-2015) for the support of research initiatives in Technical Education Institutions (TEI) (budget € 21 million), post-doctorate research (€ 30 million) and research projects implemented by a primary investigator (€60 million);
- Collaboration (2009-2015) for the support of collaborative research by private companies and public research organisations (about €230 million);
- 'Support for R&D in groups of small and medium-sized enterprises (SMEs)' (2009-2015) for the financing of research projects implemented by groups of SMEs, public research organisations, technology transfer organisations and technology suppliers (€ 10.7 million);
- 'Support for R&D in new firms' (2009-2015) for the financing of small to medium research projects targeting project and process innovations (€ 10.8 million);
- New Innovative Entrepreneurship (2011-2015) for the provision of grants in manufacturing sectors (€30 million);
- ARISTEIA II for the support of excellent scientific networks in Greece of young scientists (€ 61 million);

34 http://www.gsrt.gr/central.aspx?sId=106I465I1244I646I438983&olID=777&neID=810&neTa=15&ncID=0&neHC=0&tbid=0&lrID=2&oldUIID=aI777I0I119I428I1089I0I3&actionID=load&JScript=1, December 2014

35 http://erawatch.jrc.ec.europa.eu/erawatch/opencms/search/advance-search.html?action=search&query=&matchesPerPage=5&displayPages=10&index=Erawatch%20Online%20EN&sort=&searchPage=1&tab=template&subtab=&orden=LastUpdate&reverse=true&searchType=advanced&country=gr&avan_other_prios=false&intergov=all&avan_type=support#listado, December 2014

- Creation (2009-2015) for the support of new innovative enterprises, notably highly knowledge intensive (spin off and spin out) (€44 million);
- PAVET 2013 for the support of R&D activities of dynamic enterprises that will lead to added-value products and services (€29 million);
- MARE (Mediterranean Activities for Research and Innovation in the Energy sector) project for the financing of innovative technologies in the energy sector.

No new calls were launched in 2014, but pre-announcements indicate that the administration is expecting the finalisation of the negotiations of the OP Competitiveness to start launching calls. The pre-announcements include an Entrepreneurship Programme for SMEs (EPIXEIROUME DYNAMIKA) and a Business Opportunity programme (EPIXEIRHMATIKH EYKAIRIA) across all regions... The Business Opportunity Programme aims to fund entrepreneurial schemes of unemployed[36]. Both programmes address the economic sectors recognised as important in ESETAK for the structure of the new RIS3 (agro-food industry, tourism, life sciences, energy production and services, transport services and logistics, environmental sciences, IT and building materials).

Societal Challenges (Energy, Health and Environment, Agriculture) accounted for about 12% of GBAORD in 2012 and for almost 14% in 2013 (Table 2).

Current policies and funding are not explicitly focused on specific priorities addressing societal challenges identified in Horizon 2020, but are rather generic and focus on SMEs, the enhancement of innovation in general and the enhancement of human and physical resources for R&D.

The participation of Greece in the Innovation Investment Package is expected to stimulate innovation in sectors of societal challenges. Within this context, a Memorandum of Understanding was signed in March 2014 between GSRT and JRC for the realisation of common actions between Greek RPOs and JRC in the areas of Energy, Marine Services, Food, Health and Safety[37].

In spite of the crisis GBAORD increased annually by about 15% on average in the period 2011-2013. Generic R&D policies dominate over the thematic/sectoral, as evidenced by the allocation of GBAORD (Table 1). *General advancement of knowledge* persistently remains around 50% of total GBAORD. Block funding from General University Funds (GUF) increased by almost 13% from 2011 to 2012 but went down to below 2011 levels in 2013. This was caused mainly by the reduction of faculty and administration personnel salaries, complying with the general salary cuts of civil servants in an effort to reduce the budget deficit. *General advancement of knowledge* from other sources than GUF followed a rather opposite trend, decreasing by more than 10% in 2012 and returning to 2011 levels in 2013. From thematic areas, *Culture, recreation, religion and mass media received* most of the funds, steadily increasing in the period 2011-2013 (Table 1).

[36] http://epan2.antagonistikotita.gr/uploads/Prodhmosieush%20Epixeirhmatikh%20Eukairia.pdf, December 2014

[37] http://www.ekt.gr/content/display?ses_mode=rnd&ses_lang=el&prnbr=88825, December 2014

Table 1: Total GBAORD (€ million)

	TOTAL GBAORD (€m)			GBAORD %		
	2011	2012	2013	2011	2012	2013
Exploration and exploitation of the earth	24.8	27.4	40,0	3.8	3.7	4.7
Environment	5.6	9.9	16.8	0.9	1.4	2.0
Exploration and exploitation of space	16.2	14.8	12.1	2.5	2.0	1.4
Transport. telecommunication and other infrastructures	22.9	18.4	35.3	3.5	2.5	4.1
Energy	20.8	29.4	21.0	3.2	4.0	2.5
Industrial Production and Technology	14.4	20.1	18.0	2.2	2.7	2.1
Health	45.5	49.3	69.0	7.0	6.7	8.0
Agriculture	31.4	27.5	28.1	4.8	3.8	3.3
Education	4.5	5.8	4.5	0.7	0.8	0.5
Culture. Recreation. religion and mass media	96.6	123.2	163.5	14.9	16.8	19.0
Political and social systems. structures and processes	4.9	14.7	22.1	0.8	2.0	2.6
General advancement of knowledge: R&D financed from General University Funds (GUF)	298.1	335.3	355.0	46.0	45.8	41.4
General advancement of knowledge: R&D financed from other sources than GUF	57.1	51.3	69.7	8.8	7.0	8.1
Defence	5.7	5.0	3.6	0.9	0.7	0.4
Total civil R&D appropriations	648.5	731.9	858.6	100.0	100.0	100.00

Source: Eurostat. Total GBAORD by NABS 2007 socio-economic objectives

The R&I strategy for the next programming period (ESETAK), which includes the RIS3 but goes beyond it, was published at the end of 2014 and focuses on the following priorities:

- areas of traditional strength for the country (examples: shipping, tourism, energy)
- areas of recent successes in terms of critical mass and on-going activities (examples: IT, pharmaceuticals, engineering, energy);
- areas of high added value and able to deliver major economic benefit and employment prospects (examples: energy, nutrition – food sciences); and
- areas of national interest (examples: food production, archaeology, culture, energy, defence, biomedicine).

In total, 8 technological areas were identified matching the priorities; Biosciences, Agro-Biotechnology Nutrition, Energy and Environment, Computer Science and Mathematics, Physical Sciences, Engineering, Social Sciences and Arts and Humanities, with about 28% of the funding for the next programming period 2014-2020 allocated to Biosciences,

followed by Engineering (18%) and Physical Sciences (12%), as shown in the following table[38]. About 27% of total funding is expected to be dedicated to societal challenges (proposed funding of Table 2 allocated in the areas of Agro-Biotechnology nutrition, Energy and Environment, Social Sciences, Arts and Humanities).

Table 2: Thematic priority areas in the next programming period.

Technology areas	**Proposed funding (2014-2020) € million**	**% of total**
Biosciences	2.478,80	28,0%
Agro-Biotechnology nutrition	442,60	5,0%
Energy and Environment	885,30	10,0%
Computer Science and Mathematics	885,30	10,0%
Physical Sciences	1.062,30	12,0%
Engineering	1.593,50	18,0%
Social Sciences	619,62	7,0%
Arts and Humanities	442,63	5,0%
Reserve funding	442,63	5,0%
Total	**8.852,68**	

Source: National Strategic Framework for Research and Innovation 2014-2020, National Council of Research and Technology, pg. 60 and own calculations

2.3 National Reform Programmes 2013 and 2014

Based on the NRP 2014 R&D policy in the next programming period 2014-2020 will focus on[39]the following horizontal aspects:

- The enhancement of the human R&D potential through the implementation of programmes that will prevent brain drain (programme for "supporting enterprises for recruiting high level scientific personnel");
- The strengthening of the national research system and the promotion of the optimal use of available resources through the finalisation of a National Roadmap for research infrastructures (already underway); the restructuring of the research organisations; the promotion of the mobility of researchers; the enhancement of the demand of research and innovation services by Ministries or Regional Authorities as well as the role of the research centres in the regional development;
- The enhancement of private RDI investments through a targeted approach in areas where Greece has comparative advantage according to the Smart Specialisation Strategies (one national and 13 regional ones); the creation of new enterprises with a research orientation; the creation of new financial instruments for RDI and the adoption of measures for the strengthening of links between universities/research institutions and the private sector;

[38] National Strategic Framework for Research and Innovation 2014-2020, National Council of Research and Technology, Appendix III Data Tables

[39] Greek National Reforms Programme 2014, April 2014, pg. 51-56

- The strengthening extroversion of the local research community through European R&D programmes; enhancement of the role of the country in international research organisations (ESA. EMBO. CERN); bilateral and multilateral agreements on R&D and synergies between Horizon 2020 and Structural Funds;
- The systematic cooperation of competent Ministries for the planning of research activities.

In 2014, the R&D intensity target for 2020 increased to 1.21% of GDP compared to the previous target of 0.69% of GDP. Key drivers for the revised target were:

- Economic growth and primary surplus for the year 2013 which will allow increasing funding for R&I (while, however, hopefully at the same time increasing GDP and exercising tensions from the side of the denominator);
- Increased funding of about 50% for R&I earmarked in the Partnership Agreement (PA)[40] compared to the previous programming period. Funds for R&I will reach €1.25 billion and when coupled with the national contribution will reach €1.5 billion;
- A target of 30% increased absorption from the Horizon 2020 budget compared to FP7;
- Increased funding of business R&D;
- The expected leverage effect due to the Smart Specialisation Strategy;
- The stabilisation of salaries and annual budgets of PRCs and HEIs;
- The adoption of the new RTDI Law (although the Law itself is not triggering new funding).

The assessment of Greek NRP 2014 by the European Commission calls for fast implementation of the new RTDI law and a national RIS3 with a strong thematic focus. Efforts are also needed for the strengthening of collaboration between academia and industry for the efficient translation of scientific research into new marketable goods and services[41].

2.4 Policy developments related to Council Country Specific Recommendations

In the EU/IMF financial assistance programme for Greece there are no direct R&I commitments except for an obligation to adopt a revised R&D and innovation legislation (RTDI law) by July 2014 based on the competitive advantages of the country and to ensure full implementation of a revised legal framework by December 2014. The new RTDI Law was enacted in December 2014.

The RIS3 and its Action Plan must be fully aligned with the Partnership Agreement (PA) 2014-2020[42]. The PA calls for "strengthening collaboration between universities/research

[40] Funding coming from the European Structural and Investment Funds under the Thematic Objective 1 (Research and Innovation).

[41] COMMISSION STAFF WORKING DOCUMENT, Assessment of the 2014 National Reform Programme for Greece, pg. 16

[42] The Second Economic Adjustment Programme for Greece Fourth Review – April 2014, European Economy, Occasional Papers 192, April 2014

centres and the private sector and sets up a deadline at the end of December 2016 for the design of a new national or regional innovation strategy that will stimulate private RDI investment"[43].

Other initiatives that indirectly affect R&I commitments and are included in the Memorandum of Understanding on Specific Economic Policy Conditionality are the following:

- Restructuring of organisation charts and internal regulation of HEIs by June 2014 and preparation of an impact assessment study of the ATHENA project after the first academic year of implementation by September 2014. The plan was fully operational by April 2014, in compliance with the deadline set in the Memorandum of Understanding on Specific Economic Policy Conditionality[44]. There are discussions on a potential reinforcement of streamlining educational establishments.
- Introduction of tax credits on scientific and technological R&D as required under Art. 22A of the Income Tax Code by May 2014[45]. This obligation was fulfilled by the issuance of L.4223/2013.

2.5 Funding trends

Total R&D funding for the next programming period is difficult to estimate because of the current austerity programme and GDP contraction that hamper national planning. At present the amount earmarked includes €1.32 b from the Structural funds (Thematic Objective 1) which will reach € 1.8 b if national funding is ensured. If innovation funding is included (all thematic objectives) then the amount increases to €8 b in the period 2014-2020 and will principally be provided by the State (27.1%-Ordinary Budget + Public Investment Budget), BES (26.9%) and Structural Funds (24.8%) as analysed in Annex 3[46].

The government is the principal funder of R&D activity, covering 52.3% (€ 766.2m) of total GERD in 2013, compared to 50.4% in 2012 (€ 673.5m). HEIs and public research organisations received the bulk of this funding (90%), with Business Enterprise Sector (BES) only receiving € 43.5m and the private non-profit sector an amount slightly higher that € 1 m.

The BES is the second biggest contributor to GERD, providing € 443.9 m (30.3% of total), 7% more compared to 2012. More than 89% of this capital funds BERD. HEIs receive less than € 30m.

Funding from abroad covered 14% (€ 204.9m) of total GERD in 2013, compared to 15.8% in 2012 and 14.8% in 2011. The majority of the funds were channeled to HEIs and public RPOs (about 70 %%).

[43] Position of the European Commission Services on the development of Partnership Agreement and programmes in Greece for the period 2014-2020, November 2012

[44] The Second Economic Adjustment Programme for Greece Fourth Review – April 2014, European Economy, Occasional Papers 192, April 2014, pg. 101

[45] The Second Economic Adjustment Programme for Greece Fourth Review – April 2014, European Economy, Occasional Papers 192, April 2014

[46] National Strategic Framework for Research and Innovation 2014-2020. National Council of Research and Technology

The Greek National Reforms Programme 2014 called for an increased R&D spending setting the R&D intensity target to 1.21% of GDP. In order to achieve this target and using forecasts by the Ministry of Finance which foresee GDP growth rates of the order of 4% per year after 2016 the GSRT requests in its national strategy a rise of national funding to reach €600 million per year in 2020. This figure is over-ambitious compared to €50 million in 2014 (a record low, because of the end of the previous programming period) and depends largely on the accuracy of GDP growth, being the denominator (GERD/GDP) and budget surplus forecasts which will affect total GERD.

2.5.1 Funding flows

Table 3: Basic indicators for R&D investments.

	2009	2010	2011	2012	2013	EU28 (2013)
GDP growth rate	-3.1p	-4.9p	-7.1p	-7.0p	3.9p	0.1
GERD (% of GDP)	-	-	0.67b	0.69	0.8	2.07 (2012)
GERD (euro per capita)	-	-	125.1b	120.3	132.5	530.1 (2012)
GBAORD - Total R&D appropriations (€ million)	849.6	684.0	648.5	731.9	858.6	90506
R&D funded by Business Enterprise Sector (% of GDP)	-	-	0.22	0.21	0.24	1.12% (2011)
R&D funded by Private non-profit (% of GDP)	-	-	0.01	0.01	0.01	0.03%e(2011)
R&D funded from abroad (% of GDP)	-	-	0.1	0.1	0.1	0.19% (2011)
R&D funded by Framework Programmes(€ million)	773.6*					
R&D funded by the Structural funds (€ million)			826.8 **	1.043.6 **		
R&D related FDI (€ million)						
R&D performed by HEIs (% of GERD)	-	-	40.2%	39.9%	37.5%	23.6.% (2012)
R&D performed by Government Sector (% of GERD)	-	-	23.8%	24.8%	28%	12.2% (2012)
R&D performed by Business Enterprise Sector (% of GERD)	-	-	34.9%	34.3%	33.3%	63.3% (2012)
Share of competitive vs. institutional public funding for R&D*****	22/78	16/84	22/78	31/69	50/50	N/A
Employment in high- and medium-high-technology manufacturing sectors as share of total employment	1.5%b	1.5%	1.4%	1.3%	1.2%	5.6% (2011)
Employment in knowledge-intensive service sectors as share of total employment	32.7%b	33.3%	34.6%	36.3%	36.7%	38.9% (2011)
Turnover from Innovation as % of total turnover	n/a	n/a	n/a	11.9%	n/a	11.8% (EU-27. 2012)

* FP7 funding received 2007-2013. Think pieces 03/2014, pg.9

** GBAORD by funding mode

The Greece Partnership Agreement (PA) provides that a total of €1.3 billion will be allocated in the thematic objective "Strengthening research, technological development and innovation" in the period 2014-2020 by the ERDF (€ 935.9 million) and by the European Agricultural Fund of Rural Development (EAFRD) (€ 350.8 million)[47].

2.5.2 Project vs. institutional allocation of public funding

The responsibility of funding research is divided between the Ministry of Education and Religious Affairs (GSRT and Secretariat of Education and Life-Long Learning) and the Ministry of Development and Competitiveness (Secretariats for Public Investments and of Industry), of which the former has the overall responsibility for supporting regional development in general including entrepreneurship and partly (recently) innovation. The Ministry of Development and Competitiveness is managing Structural Funds. Funds coming from the Regional Operational Programmes are typically under the responsibility of the Regional Councils. The Ministry of Agricultural Development supervises the NAGREF, which undertakes research and technology in Greece in agricultural, forest, animal and fish production, the protection of crops, veterinary management of marine resources, soil science, land improvement, processing and preservation of agricultural products as well as agricultural economy and sociology through the operation of 8 RPOs.

The mechanism for fund allocation is based on the initial programming documents of the PA and the Operational Programmes which describe the specific measures at the beginning of each programming period. Institutional funding is based on the general provisions of budget allocation, now respecting the constraints of the austerity programmes.

According to Eurostat, project based funding has been steadily increasing and accounted for 49.9% of total GBAORD funding in 2013 (against 31.4% in 2012 and 21.5% in 2011). Institutional funding accounted for 50.1% of total GBAORD funding in 2013 (against 68.6% in 2012 and 78.5% in 2011)[48]. The steady decrease of institutional funding is attributed to the austerity policy of the last three years. Project funding is co-funded by the Structural Funds, hence is not so much affected by the crisis and supported R&D activities.

Institutional funding is not based on an institutional assessment[49]. While both HEIs and PROs are subject to evaluations the evaluation results are not linked to the budget allocation. An effort to link incremental funding to excellence in the '90s was abandoned very soon.

The largest part of institutional funding is channelled to universities and research centres in the form of block grants, which are largely path dependent.

The main channel for competitive funding is the O.P. for Competitiveness and the Regional O.P.s, both co-financed by the Structural Funds. Almost all non-block funding including the programmes described in par. 2.2 above is distributed via calls for proposals, most of them launched by the Ministry of Education and Religious Affairs through the GSRT (for applied research and innovation). All these calls are competitive and evaluated by experts (national and international). Peer review principles are used in all calls for project funding and efforts are made to maximise the number of non-national evaluators involved[50].

[47] Greece Partnership Agreement 2014-2020, May 2014, pg. 122
[48] Total GBAORD by funding mode (gba_fundmod)
[49] European Research Area, Progress Report 2014, pg. 104
[50] European Research Area, Progress Report 2014, pg. 23

Evaluators are scientists selected either from an official registry or from the «Web of Science»[51].

There is an effort to increase international peer review, introduced by law 3653/2008, for project selection. Law 3777/2009 introduced provisions similar to processes followed by the European Commission, such as the decision on final ranking of proposals and selection decisions to be taken by committees and not individual peers. This process has already been implemented in many calls. International panels (composed of foreign researchers and diaspora Greeks) evaluated "Clusters", "Innovation Poles", "Cooperation" and "Excellence". Smaller traditional programmes like PAVET (industrial research support) are evaluated by peers and committees composed of Greek scientists. Research funding organisations must apply core principles for international peer review including excellence, impartiality, transparency, appropriateness, in order to maximise efficiency and speed of project selection[52].

Several incubators of start-ups launched in recent years[53]:

- Iqbility is an incubator for start-ups in the ICT sector developed by a Quest Group of Companies in partnership with the PJ Tech Catalyst fund (Piraeus Bank). Iqbility provides office space and advising/mentoring as well as pre-seed funding (€30.000-€60.000) to start-ups and currently incubates 4 start-ups[54];
- COSMOTE Start up was an incubator facility offered by COSMOTE with the support of OTE Academy FOUND.ATION[55] and Hellenic Management Association of Greek entrepreneurs aiming to help 10 start-ups to turn their ideas into business and start their own companies. The project was funded by PJ Tech Catalyst fund and concluded successfully[56];
- EGG (Enter. Grow. Go) is an incubator offered by Eurobank in cooperation with Corallia to 20 teams offering office space, support and 3 months training to start-ups. The programme has a duration of 12 months[57];
- Microsoft Innovation Centre Greece provides 20 working spaces to students, entrepreneurs and start-ups aiming to help them develop innovative software solutions. The Centre was inaugurated in 2008 by Bill Gates and the Greek Prime Minister[58];
- Metavallon is a non-profit volunteer organisation providing incubator facilities (45 working spaces) to 10 teams. The programme includes 3 stages: the "Gymnasium" which is a 2 months pre-acceleration stage (Lab), the "Academy" which is a 6-8 months acceleration stage (Accelerator) and "Institute" (Hub) with up to 2 years incubation facility. The Accelerator offers training, coaching, mentorship, networking, a one-month start up mission to San Francisco and the Silicon Valley

[51] Analysis of the ERA state-of-play in Member States and Associated Countries: focus on priority areas, Country Report, Greece, Prepared for The European Commission Directorate-General for Research & Innovation, Unit B1 by Konstantina Tsiki, INNOVA EUROPE (May 2013)
[52] Law 4009/2011, this criterion is also mentioned in the Work Programmes issued by the Greek Government
[53] http://www.emea.gr/incubators-αθήνα-infographics-startups-emeagr/337519, December 2014
[54] http://www.iqbility.com/who-we-are, November 2014
[55] Found.ation is one of the first co-working spaces in Athens for young technology companies
[56] http://www.cosmotestartup.gr/, December 2014
[57] http://www.theegg.gr/en/pages/home_description, December 2014
[58] http://www.microsoftinnovationcenters.com/, December 2014

and €25.000 in pre-seed funding for 8% equity through their Investing Partners[59]. The Jeremie Odyssey Venture Partners has invested in Metavallon[60].

- The Athens Chamber of Commerce and Industry launched in September 2014 an Incubator for start-up companies (THEA) aiming to provide administrative support, ad hoc consulting and networking to about 50 business ventures for a period of 18 months[61]. The project is part of the "Athena Plan" and is financed by structural funds (Operational Programme Attica)[62]. The deadline for applications from start-ups was extended to the end of November 2014 due to increasing demand.

In addition a large number of events and mentoring activities are promoted by chambers, associations and NGOs recognising that the best road to development is the revival/renewal of the business sector.

Institutional funding in Greece is exclusively block funding. There has been hefty opposition to evaluations and accreditations discouraging efforts to link assessments to institutional funding. As salaries are fixed based on formal criteria (rank and seniority) and investments and operational budgets are distributed with equal growth (or reduction) rates on the previous year's budgets there is no room for rewarding merit and excellence. To make up for this centralised approach to block funding a large share of funding is attributed via competitive calls.

A system that will allow for more competitive institutional funding needs to be devised to create incentives for excellence and ensure longer term planning in excellent institutions.

Efforts should be made for higher quality and higher ambitions in the use of structural funds. The absorption of Structural Funds (ERDF, ESF, CF) in terms of co-financed public expenditure has increased from 18% in 2010 to 31.5% in 2011, 45.8% in 2012 and 66.5% in 2013 with legal obligations amounting to 113.4%[63].The Memorandum of Understanding on Specific Economic Policy Conditionality devotes a whole chapter of actions to achieve this objective, including elimination of "sleeping" approved contracts, estimation of overbooking and restriction to approve new projects unless these actions are concluded.

2.5.3 R&I funding

GUF and RPOs institutional funding is used for fundamental and applied research. Competitive funding is increasingly focusing on applied research and development with efforts to support commercialisation of research output through the university-industry cooperation schemes. Funding of start-ups is supported by JEREMIE-funded initiatives in selected areas as well as by the private sector. Despite recent efforts and policy declarations the commercialisation of research results remains underfunded; the extent to which this is due to lack of supporting schemes or lack of demand is subject of disagreement between stakeholders.

[59] http://www.metavallon.org/, December 2014
[60] http://www.startupgreece.gov.gr/content/jeremie-openfund-ii-spring-2014-call-proposals-0, December 2014
[61] http://www.ekt.gr/content/display?ses_mode=rnd&ses_lang=el&prnbr=89389, December 2014
[62] http://www.theathensincube.gr/pages/activity, December 2014
[63] Greek National Reforms Programme 2014, April 2014, pg. 19

There are no studies on either the leverage or crowding out effect of public funding. All competitive schemes supporting the business sector are trying to leverage private funding. This is, however, difficult to achieve so the primary target is to trigger awareness in the business sector on the merits of R&I. This is a difficult task in a country with no research culture where the private sector suffers from continuous profit decreases. As a consequence private funding (BERD+private non-profit funding) account for 31.1% of total R&D funding but is hoped to rise to 40% in the programming period 2014-2020. The relative contributions to R&D in EU, US and Japan are nearly the opposite, i.e. 66% private and 33% public[64].

R&D capital expenditures are tax-deductible expenses from the gross income of businesses deducted equally in 3 years starting from the year in which they take place. The new tax law (voted in December 2013) provides for tax exemptions of R&D expenditure allowing for up to 30% deduction of R&D expenses (L.4223/2013). Subsidies and grants are provided for the employment of personnel devoted to a particular innovative programme (L. 3908/2011) based on the age and/or size of the company, number of employees, innovative nature of business etc.[65]. Fiscal incentives include tax allowances for 10 years for newly established companies or 8 years for all other companies and grants for lease payments for the acquisition of new infrastructure for a maximum period of 7 years. The maximum level of the contribution depends on the area in which the specific programme takes place and the size of the company implementing it. It can reach up to 50% for very small companies in less developed regions (North and South Aegean islands, Ipeiros, Western Greece, Eastern Macedonia and Thrace etc.).

Public Private Partnerships (PPPs) will be explored in the context of the new EU Innovation Investment Package adopted in February 2014[66].

The recent financial crisis and the shortage of capital have minimised indirect R&D funding and financing from venture capital (venture capital as % of GDP was equal practically to zero in 2012 but has started to pick up in 2013 thanks to the Jeremie Initiatives described below). The Innovation Fund established in June 2012 by the Ministry of Education and Religious Affairs and the Ministry of Development and Competitiveness with a total capital of €30m has not kicked off yet.

Funding of innovation activities has traditionally been of two kinds:

1. Measures including both R&D and Innovation (e.g. Collaboration; Clusters) where the innovation component is difficult to distinguish from research
2. Measures supporting investments where innovation is incorporated in new equipment; again there is no accounting distinguishing the innovative component of new investments. In February 2011, a new investment law 3908/11 entered into force. It provided fiscal and tax incentives of various categories of expenditure, among which R&D and innovation programmes implemented by enterprises in collaboration with Higher Education Institutions from Greece or the EU.

[64] National Strategic Framework for Research and Innovation 2014-2020, National Council of Research and Technology, pg. 7

[65] EVCA Tax Benchmark Study 2012, June 2013

[66] Press release of Innovation investment package: private and public partnerships for research and innovation, February 2014

Pure innovation measures include:

- The national Innovation Voucher Scheme: From September 2009 up till 2012, 286 projects have been approved. In these projects research components are also included. The Scheme is intended to run also in the current programming period;
- Support to innovative companies through matching private venture capital funds. Four Funds are financed by JEREMIE;
    - The Openfund established in 2008 by 7 investors with an initial capital of €500.000 to provide pre-seed and seed financing to technology companies. Investment tickets were €20.000-€50.000 for a 15% equity stake. The fund raised supplementary financing of €10 million (Openfund II), principally from the European Investment Fund and 11 private investors. By April 2014, the Fund had invested in 7 companies (€ 2.5 million) but will have invested the totality of its funds by the end of 2015[67]. A call was launched in May 2014 for the provision of pre-seed and seed funding (€50.000-€100.000)[68].
    - The Odyssey JEREMIE Partners Fund is focused on ICT investments and has the support of Eurobank. By April 2014, Odyssey JEREMIE Partners had invested a total of € 4.6 million in 4 companies. Odyssey JEREMIE Partners also funds the incubator Metavallon[69];
    - PJ Tech Calalyst Fund supported by Pireaus Bank provides seed financing to ICT companies and has a total capital of € 15 million. By April 2014, the Fund had invested € 2 million in 7 companies and one start-up incubator (Iqbility) and was ready to finance another 3 companies[70];
    - Elikonos Jeremie Sicar has a total capital of € 17 million and investments in 4 companies (€ 4 million)[71]. Investment focus is on clean technology and ICT.

[67] http://fotiskollias.wordpress.com/2014/04/14/jeremie-funds-%CE%B5%CF%80%CE%B5%CE%BD%CE%B4%CF%8D%CF%83%CE%B5%CE%B9%CF%82-%CE%BC%CE%B5-%CF%84%CE%BF-%CF%83%CF%84%CE%B1%CE%B3%CE%BF%CE%BD%CF%8C%CE%BC%CE%B5%CF%84%CF%81%CE%BF-%CF%80%CE%BF%CF%85/, December 2014

[68] http://www.startupgreece.gov.gr/content/jeremie-openfund-ii-spring-2014-call-proposals-0, December 2014

[69] http://fotiskollias.wordpress.com/2014/04/14/jeremie-funds-%CE%B5%CF%80%CE%B5%CE%BD%CE%B4%CF%8D%CF%83%CE%B5%CE%B9%CF%82-%CE%BC%CE%B5-%CF%84%CE%BF-%CF%83%CF%84%CE%B1%CE%B3%CE%BF%CE%BD%CF%8C%CE%BC%CE%B5%CF%84%CF%81%CE%BF-%CF%80%CE%BF%CF%85/, December 2014

[70] http://fotiskollias.wordpress.com/2014/04/14/jeremie-funds-%CE%B5%CF%80%CE%B5%CE%BD%CE%B4%CF%8D%CF%83%CE%B5%CE%B9%CF%82-%CE%BC%CE%B5-%CF%84%CE%BF-%CF%83%CF%84%CE%B1%CE%B3%CE%BF%CE%BD%CF%8C%CE%BC%CE%B5%CF%84%CF%81%CE%BF-%CF%80%CE%BF%CF%85/, December 2014

[71] http://fotiskollias.wordpress.com/2014/04/14/jeremie-funds-%CE%B5%CF%80%CE%B5%CE%BD%CE%B4%CF%8D%CF%83%CE%B5%CE%B9%CF%82-%CE%BC%CE%B5-%CF%84%CE%BF-%CF%83%CF%84%CE%B1%CE%B3%CE%BF%CE%BD%CF%8C%CE%BC%CE%B5%CF%84%CF%81%CE%BF-%CF%80%CE%BF%CF%85/, December 2014

In addition in July 2013 a MOU was signed between the Ministry of Development and Competitiveness and the German bank KfW for the creation of new Investment Fund (Institution for Growth) by the end of 2013 which will finance regional development mostly of SMEs and promote development and innovation. In December 2013, the Greek Parliament voted on the law for the establishment of this Fund. Onassis Foundation has also agreed to contribute €30m to the Fund. Institution for Growth (IfG) established the first of the three sub funds in May 2014 in Luxemburg with €100 million contribution from Greece and €100 million contribution from KfW[72].

Based on Eurostat data, only 18% out of total product/processes innovative companies (innovation core activity) in Greece received public funding in 2012[73].

2.6 Smart Specialisation (RIS3)

Smart specialisation is a significant part of ESETAK in the period 2012-2015. RIS3 will be developed both at national and at regional level (13 plus 1 smart specialisation strategies):

- At the national level, emphasis will be placed on sectors affecting the economy, namely the agro-food industry, tourism, life sciences, energy production and services, transport services and logistics, environmental sciences, IT and building materials and how these sectors can impact the viability, export potential, innovation and existing scientific specialisation of local human resources in research and development (HERD). These sectors will be further specified through the collaboration of businesses with academia and the identification of synergies[74];
- At the regional level, emphasis will be placed on sectors that could have a regional impact taking into account the economic peculiarities of each region. The aim will be for small scale actions through research, knowledge transfer and innovation[75];

Regional Smart Specialisation Strategies for 13 regions were prepared in 2013 by consultants in cooperation with the authorities taking into account a comprehensive analysis of the regional innovation landscape (SWOT analysis). The following priorities were identified by region:

- Attica: transport systems (maritime and urban), creative industries, knowledge intensive business services; (green) ICT as a key enabling technology for efficiency improvements in the private and public sectors, eco-innovation for the enhancement of urban environment[76];

[72] https://www.kfw.de/KfW-Group/Newsroom/Aktuelles/Pressemitteilungen/Pressemitteilungen-Details_203840.html, December 2014

[73] Innovation in high-tech sectors (CIS 2008, CIS 2010, CIS 2012), EU Member States and selected countries [htec_cis6]

[74] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 31-32

[75] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 100-101

[76] RIS3 Assessment: Attica, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

- Central Macedonia: eco-innovation across manufacturing, agricultural and service (green ICT and tourism) sectors, and specific innovation actions to improve efficiency through e-government, public-private partnerships for service delivery[77];
- Eastern Macedonia and Thrace: stronger innovation policy integrating the ideas of smart specialisation, identification of niche markets both in domestic and export markets, manufacturing and the regeneration of the industrial tissue of the region, enhancement of the competitiveness of SMEs[78];
- Western Macedonia: adoption of a more diversified approach building on existing clusters of business activity and shifting from energy into higher-value added activities with a strong focus on exports[79];
- Crete: agro-food sector (production, packaging, food processing, Mediterranean diet), the cultural-tourist sector (hospitality, travel agencies, cultural capital, cultural activities), and the technological educational sector (research centres, universities, technology park) and its connection to the other two sectors, reduction of the dual economy, with a split between low technology agricultural and tourism activities and high technology research and education and a few spin-off firms[80];
- Ionian islands: bio-economy, both on natural resources and biodiversity (with a potential for reinvigorating the agricultural sector through the production of new crops and a focus on designated origin, etc. products) as well as aquatic resources (blue-biotech) [81];
- Epirus: RTDI investment on R&D for the dairy industry and other agro-food firms, ICT in regional health and tourism services and manufacturing production and, technology know-how related to environmental protection and sustainable exploitation of the natural biodiversity[82];
- Peloponnese: cluster programmes for agro-food, tourism and manufacturing sectors and cross-sectoral support for technological upgrading of business sectors[83];
- North Aegean: bio-economy, branding based on natural environment[84];

[77] RIS3 Assessment: Central Macedonia, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[78] RIS3 Assessment: East Macedonia and Thrace, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[79] RIS3 Assessment: Dytiki Makedonia, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[80] RIS3 Assessment: Crete, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[81] RIS3 Assessment: Ionian islands, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[82] RIS3 Assessment: Epirus, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[83] RIS3 Assessment: Peloponnese, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

- South Aegean: cross-sectoral technology upgrading and adaptation of production processes to reduce energy use, reduce material input and waste generated, higher value products and services related to tourism[85];
- Sterea Ellas: modernisation of the agro-food sector, promotion of environmental and energy saving technologies and ICT, cross-sectoral opportunities for applying other key enabling technologies, notably ICT[86];
- Thessalia: cross-sectoral opportunities for applying other key enabling technologies, notably ICT, strengthening the access of regional firms to knowledge intensive business services, focus on metal production and construction materials along with agro-food sector and related industries[87];
- Western Greece: bio-economy[88].

Regional peer review workshops were organised, aiming at presenting the work on RIS3 and discuss the strategies with regional stakeholders.

In terms of financial instruments, it is proposed that a mixture of contracting out of programme management and public-private-partnerships (PPP) for future programmes is implemented.

Monitoring and evaluation of RIS3 is envisaged to be taken up by GSRT and the regional authorities.

All 14 RIS3s are under negotiation with the Commission at the moment (DG Regional Development).

2.7 Evaluations, consultations, foresight exercises

Institutional evaluations are systematically in place:

- Evaluation of RPOs started at the initiative of the GSRT (Law 2919/2001). The process was organised ad hoc by the GSRT convening panels of international experts by subject area. The law stipulated that the overall academic performance of the organisation was evaluated with respect to academic publications, citations, cooperation with the business sector and civil society and operational cost. The last evaluation of RPOs took place in 2013, eight years after the previous one (2005). By and large the evaluations were positive with limited recommendations for improvement.

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[84] RIS3 Assessment: North Aegean, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[85] RIS3 Assessment: South Aegean, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[86] RIS3 Assessment: Central Greece, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[87] RIS3 Assessment: Thessaly, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

[88] RIS3 Assessment: Western Greece, A report to the European Commission, Directorate General for Regional Policy, Unit I3 - Greece & Cyprus, December 2012 (final version), Reid A., Komninos N., Sanchez J., Tsanakas P.

The new RTDI Law 4310/2014 (Art.31) introduced new evaluation methods of research organisations. RPOs are evaluated every 5 years by 5-7 members committees of external evaluators from Greece and abroad. The process is supervised by GSRT. Evaluation is based on quality and efficiency indicators derived by GSRT in accordance with international RTDI best practices. The reports are submitted to NCRTDI and GSRT.

For the evaluation of funding programmes and the monitoring of their implementation, a registry of certified evaluators will be created by GSRT;

- Institutional evaluations of HEI are more recent and started following the country's obligations in the context of the Bologna process. Law 4009/2011 provides for internal and external evaluations of departments of HEIs and TEIs as well as for the accreditation of institutions and academic curricula by Hellenic Quality Assurance Authority (HQAA). By April 2014, a total of 485 internal evaluation reports had been completed (2008-2014); 285 for HEIs and 200 for TEIs, the bulk of which (475) in the period 2008-2012[89]. In the same period (2008-April 2014), 389 external evaluations had been concluded, the bulk of which (214) in 2013 and 2014[90]. The external evaluation was based on quantitative (research personnel, students, administrative staff) and qualitative criteria (curriculum, teaching, research, other services) and assessed through structured questionnaires sent to Quality Assurance Units of HEIs[91].

External evaluations were peer reviewed; 627 questionnaires were sent to external international experts and the response rate was 49.5%[92]. The evaluations were also reviewed by the HEIs and the response rate was 64%[93].

The evaluation of funding programmes will reveal weaknesses in absorption mechanisms and problems in their implementation. The evaluation of RPOs and HEIs will reveal the performance per scientific field of expertise and will help strengthen the scientific areas that have been prioritised by ESETAK.

In the first semester of 2014, HQAA started the evaluation of HEIs and TEIs taking into account the internal and external evaluation reports of their departments.

Research institutes and lobbying groups publish occasionally studies that do not constitute systematic evaluations but are critical to the national development policies including aspects of R&I. Examples include:

- A report released by McKinsey and Company in March 2012 defining the new growth model for Greece in the next decade. The report identifies lack of innovation support (lack of collaboration between academia and the industry) as one of the barriers for growth[94] and acknowledges the redesign of University-Business R&D patenting for the enhancement of innovation and partnership as one of the cross sector priorities for growth[95];

[89] Annual Report Hellenic Quality Assurance Authority 2013-2014, July 2014, pg.34
[90] Annual Report Hellenic Quality Assurance Authority 2013-2014, July 2014, pg. 35
[91] Annual Report Hellenic Quality Assurance Authority 2013-2014, July 2014, pg. 48-51
[92] Annual Report Hellenic Quality Assurance Authority 2013-2014, July 2014, pg. 68
[93] Annual Report Hellenic Quality Assurance Authority 2013-2014, July 2014, pg. 74
[94] Greece 10 Years Ahead, Defining Greece's New Growth Model and Strategy, McKinsey and Company, March 2012 , pg. 19
[95] Greece 10 Years Ahead, Defining Greece's New Growth Model and Strategy, McKinsey and Company, March 2012 , pg. 33

- A Greek Start up Manifesto was published in June 2014. The Manifesto was compiled by 13 Greek innovative companies, namely Antcor, Aventurine, Corallia, Helic, Intale, Nessos, Persado, Planetek Hellas, Pollfish, TalentLMS, Telesto, Ubitech and Wings ICT Solutions with the support of EU counterparties and presented key areas that need to be improved in Greece in order to enhance innovative entrepreneurship. The areas included taxes (support of a stable investor friendly tax environment), administrative barriers (removal of red tape in business incorporation), digital infrastructures (increase of broadband coverage, cloud investments and expansion of e-government), financing (incentives for angel investments, abolishment of guarantees, new schemes for SMEs) and the enhancement of entrepreneurship (offer of export guarantee schemes, introduction of start-up visas, strengthening of collaboration with HEIs)[96].

There are two main macroeconomic models in Greece (one of the Bank of Greece and one of the National Centre for Economic Research) but they have not as yet been used to assess R&I impact on economic growth.

[96] Greek start up manifesto, December 2014

3. National progress towards realisation of ERA

3.1 ERA priority 2: Optimal transnational co-operation and competition

Greek policy favours international R&I cooperation[97]. Common research agendas are mainly driven by EU supported schemes. Greek research teams participate extensively to ERAnets and other EU initiatives and often play an important role in research agendas for grand challenges. Budget is thinly distributed following a bottom-up approach, rather than a top-down prioritisation.

Greece is currently active in 15 ERA-NET projects, 1 ERA-NET-Plus project, and 3 Art. 169/185 network projects (2 EUROSTARS and European and Developing Countries Clinical Trials Partnership). Greece does not participate in any JPIs or JTIs[98]. Policy actions supporting joint activities are implemented in the context of INCO-ERAnets.

Common ex post evaluation procedures are not implemented.

It is estimated that 0.9% of national funding is dedicated to joint research agendas compared to an EU average of 1.42% (2013 data). Only 1% of the R&D budget was attributed to collaboration programmes with third countries (EU average equal to 0.7%-2013 data)[99].

3.2 ERA priority 3: An open labour market for researchers. Facilitating mobility, supporting training and ensuring attractive careers

3.2.1 Introduction

Based on the University Autonomous Tool (UAT)[100], Greece has medium-low organisational autonomy and low financial, staffing and academic autonomy. It is one of the few countries (3 out of total 27 countries being examined) that continue to allocate public funding in the form of a line-item budget. Institutions are unable to keep a surplus or borrow money and may only sell their non-operational buildings with external approval. This applies also to donations and endowments to universities. Greece ranks 27th out of 29 in organisational, financial and academic autonomy and 29th in staffing autonomy[101].

Law 4076/2012 introduced provisions for the enhancement of university autonomy (e.g. the introduction of an external management board for the first time) and prescribed amended regulations for the election and promotion of faculty.

[97] European Research Area, Progress Report 2014, pg. 18
[98] NETWATCH Platform on transnational R&D programme collaboration
[99] COMMISSION STAFF WORKING DOCUMENT. Snapshots Member States of the European Union Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT European Research Area Progress Report 2014 pg. 224

[100] UAT was compiled at the end of 2010 using 38 indicators, categorised into four autonomy dimensions (organisational, financial, staffing, academic)- http://www.university-autonomy.eu/about/
[101] http://www.university-autonomy.eu/countries/greece/

Statistics for researchers in Greece are scarce and there is a discontinuity in reporting. At the end of 2011 (last available data), researchers accounted for about 0.92% of the active population compared to a EU28 average of 1.05%. In the same period, researchers accounted for 1.1% of total employment, compared to a EU28 average of 1.16%[102].

Supply of skilled and medium-skilled labour increased more rapidly than demand in the decade 2000-2010 and this trend is expected to continue in the current decade. However, as in many lagging Member States the share of Social Sciences in Humanities (SSH) is exceptionally high. A deceleration of demand, and to a lesser extent supply, for highly/medium skilled employees is expected in the period 2010-2020[103]. Unless there is a serious restructuring and increasing investments this will nurture outmigration of skilled and semi—skilled labour.

The increase of researchers' supply is attributed to the assimilation of PhD students with researchers in HEIs with a focus on their short term employment during their doctorate studies and no concern for their research career thereafter[104].

Table 4: Labour market skills forecast-demand and supply (% change).

	Demand highly skilled (medium skilled)	Supply highly skilled (medium skilled)
2000-2010	45.6 (17.6)	51.2 (13.1)
2010-2020	9.5 (6.9)	22.4 (8.8)

Source: Innovation Union Competitiveness Report 2013

Based on the findings of the Report from the 2014 ERAC Mutual Learning workshop on Human Resource and Mobility, Greece is looking for new ways to promote research excellence in public organisations and has in place tax incentives for the hiring of researchers[105].

3.2.2 Open, transparent and merit-based recruitment of researchers

Greece is a country with a heavily regulated market.

Law 4009/2011 is the principal law addressing the labour market for professors, including provision for their recruitment and promotion. The law promotes open, transparent and merit based recruitment; positions are advertised and the selection takes place with the assistance of panels composed of seven experts (2 national external members and 1 international external member). Evaluation takes place every 5 years by three member panels, based on their research, academic, teaching and scientific work. There is no evaluation of this law. Law 4115/2013 (art.34) introduced new provisions for the professional development of professors. The same law allowed professors to get transferred to other departments within the same or other Universities, as long as they

[102] Eurostat, Total R&D personnel and researchers by sectors of performance, as % of total labour force and total employment, and by sex [rd_p_perslf]
[103] Innovation Union Competitiveness Report 2013, pg. 64
[104] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 88
[105] Report from the 2014 ERAC mutual learning workshop on Human Resources and Mobility, Intersectoral Mobility, Karen Vandevelde, Brussels, March 26, 2014

serve for at least 3 years in the same department. Transfers are not allowed towards HEIs located in the two principal cities of Greece (Attica or Thessaloniki).

The new RDTI Law 4310/2014 (Art 29) reclassified the categories of researchers to class A, B, C[106]. The same law provided for the participation of at least 2 foreign researchers in the evaluation committees for the promotion of researchers of the highest two ranks (A' and B class). The same law set up a minimum term of 3 years in the same rank, as a prerequisite for the promotion of B class researchers and a regular evaluation of class A and class B researchers every 5 years starting from the enactment of the law. Evaluation takes place from a 3-member committee also including researchers of the same rank from Greece and abroad. Class B researchers who fail to get promoted after two consecutive evaluation periods (3 years) may apply for a permanent employment as research staff within the institution. Class C researchers are evaluated every 4 years and if they fail to get promoted after two consecutive evaluation periods (4 years) they may apply for a permanent employment as research staff within the institution. Evaluation criteria include patents, academic publications, books, conference participations, impact of research activity, funds attracted from research programmes, contribution to intellectual property rights, participation in spin offs, teaching skills, participation in tutorials, workshops, participation in the contribution of national and international collaborations in RTDI.

Law 3205/2003 regulated the salaries of public sector employees, including researchers. Law 4093/2012 introduced reductions in the salary levels of researchers and special scientists employed by local research organisations, in an effort to cut down public expenditure amidst of the financial crisis Greece is experiencing. The highest salaries are being paid by the government[107]. Before the crisis, salaries were very low for first stage researchers up to the PhD level (average gross annual salary at about € 3,300, compared to a EU average of about € 16,200), attractive for second grade researchers PhD holders not completely independent (average gross annual salary at about € 29,300 compared to a EU average of about € 26,200) and very competitive for third (established) and fourth grade (leading) researchers (average gross annual salary of established researchers at about €32,000 compared to EU average of €33,300)[108]. The reduction of salaries imposed by law 4093/2012 has affected unilaterally all categories and rendered salaries non-competitive.

Greece received a total score of 43% unweighted and 40% weighted in organisational autonomy of UAT[109], with relative higher flexibility in the dismissal of the executive head (80%), the capacity to decide on academic structures (60%) and to establish other legal entities (60%). In terms of staffing, Greece received an overall score of 14% unweighted and 13% weighted, with higher flexibility in the promotion (43%) and the recruitment procedures (33%) of senior academic staff (43%)[110].

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[106] Class A researchers: contribution and design of research policy, contribution to international RTDI, management of RTDI projects, attraction of researchers, acquisition of funding for research proposals and at least 3 years experience in RTDI; Class B researchers: experience in managing RTDI projects, attracting researchers and acquiring funding for research proposals and at least 3 years experience in RTDI; Class C researchers: experience of at least 3 years in research and RTDI,

[107] European Commission DG HR Remuneration of Researchers in the Public and Private sectors, April 2007, pg. 49

[108] MORE2 Remuneration Cross country Report, April 2013, pg. 39-46-2012 data in €PPP for Greece and 2011 data for EU average

[109] Weighted by the importance of each indicator included in each of the four dimensions.

[110] http://www.university-autonomy.eu/countries/greece/

There is a national accreditation mechanism for degrees obtained outside the country, which created some discrepancies. For instance, Bachelor and Master Degrees obtained in the UK are recognised only as a Bachelor Degree in Greece because undergraduate studies have four year duration. This applies universally and not only for researchers. Language barriers are crucial, as only few courses are taught in English (only at graduate level). There is no habilitation.

In general career conditions are not attractive and as a consequence there is very limited demand for permanent research positions of foreign citizens. There is, however, an observable number (no specific evidence on trends) of European and US professors giving lectures or teaching modules in graduate courses.

Based on the findings of the MORE II study, only 20% of Greek researchers employed in public research organisations were internationally mobile in the period 2007-2010, compared to a EU27 average of 35%. 82% of all researchers were internationally mobile throughout their career, compared to a EU27 average of 65%[111]. However, this is concluded from a very low response rate (13%)[112]. Looking at researchers in HEIs, 24% of all Greek researchers employed in HEIs were internationally mobile in the period 2007-2010, compared to a EU27 average of 29%. 73% of all researchers were internationally mobile throughout their career, compared to a EU27 average of 56%[113]. However, this is concluded from a small percentage of identified Greek respondents (11%)[114].

Based on the findings of a study on the condition and mobility of researchers, carried out in 8 Member States including Greece (Austria, Bulgaria, Czech Republic, Cyprus, Greece, Hungary, Slovakia and Switzerland), the main motive for international mobility of researchers in Greece was future career development (81% of respondents), interesting research theme (67% of respondents) and high salaries/high standard of living (56% of respondents). Principal discouraging factor was complex administration of relocation (e.g. formal/legal issues – social and health insurance, employment permit, housing, transportation, etc.), and the lack of support from the home institution (41% of respondents)[115].

The programme 'Career offer to Greek-speaking researchers from abroad' provides financial support in the form of grants to Greek speaking researchers from abroad, aiming to incorporate them into the Greek RTD system. In addition, Law 2004/2011 enables

[111] European Commission DG Directorate C-European Research Area Universities and Researchers, Study on mobility patterns and career paths of EU researchers, Part III Mobility Survey of the non-university research institutes sector, June 2010, pg. 62

[112] European Commission DG Directorate C-European Research Area Universities and Researchers, Study on mobility patterns and career paths of EU researchers, Part I Mobility Survey of the higher educational sector, June 2010, pg. 91

[113] European Commission DG Directorate C-European Research Area Universities and Researchers, Study on mobility patterns and career paths of EU researchers, Part I Mobility Survey of the higher educational sector, June 2010, pg. 92

[114] European Commission DG Directorate C-European Research Area Universities and Researchers, Study on mobility patterns and career paths of EU researchers, Part I Mobility Survey of the higher educational sector, June 2010, pg. 40

[115] Ivacheva L., Gourova E., Challenges for career and mobility of researchers in Europe, Oxford Journal Social Sciences, Science and Public Policy, Vol. 38, Issue 3, pp 185-198
The survey was conducted through questionnaires to researchers (PhD students, Post Docs, experienced researchers, university lecturers, etc.) and other stakeholders (representatives of industry, research organisations, NGOs, public bodies, etc.). The sample size was fixed at 100 researchers and 30 stakeholders, with the exception of Cyprus where the sample was much smaller.

national researchers to take a sabbatical leave for up to three years to participate in research projects abroad. An estimated 10% of researchers make use of this opportunity.

During the period 2010-2012, inward and outward mobility was only supported by the measure "Support of Postdoctoral Researchers". A call was launched in November 2012 by the Ministry of Education and Religious Affairs to respond to a Call for Proposals for participation in the Pilot Programme for the mobility of young researchers of the Mediterranean Office for Youth (MOY). The call was addressed to HEIs in Greece. PD 128/2008 prescribed the process by which third party nationals may be received for research in national research institutions.

Greece had low net added researchers (about 2,000 researchers) in the period 2000-2010[116]. For transnational recruitment, cultural barriers (language and tradition of the host country) were identified as major obstacles[117]; hence there is a large number of researchers that originate from Greece[118]. It is for this reason (language barrier) that mobility is encouraged also for Cypriot researchers. Only a small percentage of local researchers (about 30%) believe that research posts are sufficiently advertised. Less than 60% believe that recruitment procedures are sufficiently transparent and merit-based[119]. Promotion from within prevents mobility and hampers open recruitment[120].

Law 4009/2011 (Art 2011) introduced the idea of scientific leaves enabling researchers to engage in research abroad for one year if researchers have been employed for a period of at least 6 years or 6 months for a total employment of at least 3 years. During the leave, researchers may receive their salary in full or even to an up to 80% increase provided their research is not funded by grants or the foreign HEI. Upon their return, they should work for at least three years in the same HEI or else their funding during the leave may be claimed by the HEI. The new RTDI Law 4310/2014 (Art. 28) renamed scientific to research leaves. Leaves of up to 3 years (unpaid) may be granted to researchers for the commercialisation of their research ideas but then they have to return to the HEI or RPO in full employment or else resign.

Law 4009/2011 (Art.16) prescribes permanent positions for professors and associate professors. Assistant professors are appointed for a term of 4 years renewable for another 4-year period. HEIs also offer the possibility to PhD graduates to undertake teaching positions for a maximum of 5 consecutive years in a HEI, under renewable one to three-year part time or full time contracts. Law 4009/2011 (Art. 23) allows the employment of professors under temporary contracts when they serve for at least three years from their appointment in the same rank and awards them 35% of the regular salary. Law 4310/2014 (Art.83) granted temporary status to professors even before the completion of 3 years from their appointment, only by way of exception and until 30.08.2016. Professors under both temporary and permanent contracts are subject to social security and health insurance; only subcontractors pay on their own for social security and health insurance.

[116] IA study on the Open, transparent, and merit-based recruitment of researchers, Final Report, March 2014, Technopolis group, pg. 21
[117] IA study on the Open, transparent, and merit-based recruitment of researchers, Final Report, March 2014, Technopolis group, pg. 20
[118] IA study on the Open, transparent, and merit-based recruitment of researchers, Final Report, March 2014, Technopolis group, pg. 23
[119] IA study on the Open, transparent, and merit-based recruitment of researchers, Final Report, March 2014, Technopolis group, pg. 24
[120] IA study on the Open, transparent, and merit-based recruitment of researchers, Final Report, March 2014, Technopolis group, pg. 27

Professors under temporary contracts should have a permanent employment elsewhere in the private or public sector. Professors under permanent contracts must reside in the city where the HEI is located.

The new RTDI Law 4310/2014 (Art. 78) decreased minimum teaching hours per week by two hours (six hours in total) for permanent faculty members. Teaching hours per week may increase up to 8 hours provided a special permission is granted. Permanent researchers are obliged also to spend at least another 12 hours in the HEI for research/administrative work.

Researchers may be employed under permanent or temporary contracts. Based on a MORE II study, permanent contracts are only available for established and leading researchers. In fact, leading researchers are only employed under permanent contracts. First grade researchers up to the PhD level have fixed term contracts (less than one year); second grade researchers at PhD level but not completely independent and established researchers have fixed term contracts in excess of 4 years[121]. Researchers must remain at the RPO for at least 20 hours per week, allocated into 4 days per week (Art. 18 Law 4310/2014)

Despite recent signs of improvement the ongoing financial crisis, still creates a very unstable environment for young researchers. Employment opportunities are very scarce, if any. Although there are no programmes directly creating employment opportunities for young researchers, ARISTEIA II for the support of excellent scientific networks in Greece creates indirectly opportunities for collaborations with the industry.

3.2.3 Access to and portability of grants

In Greece portability of national grants to other EU countries is not allowed hence researchers from foreign institutions cannot apply for grants[122]. Access to grants is open to Greek and foreign candidates, provided that the research institution is established in Greece[123].

3.2.4 EURAXESS

In Greece, the Euraxess network composed of a coordinator and local points; in total there are 13 Euraxess Services Centres in 8 different cities in Greece, providing useful information to researchers when relocating. The Centre for Research and Technology Hellas (CERTH), supervised by GSRT is the bridgehead organisation[124].

Since 2009, job vacancies at HEIs and at most RPOs are collected by the GSRT and forwarded to Euraxess -GR to be published to the Euraxess Jobs Portal. However, the participation from the business sector is still low, with only a small fraction (<2%) of the job vacancies being published on the portal[125].

[121] MORE2 Remuneration Cross country Report, April 2013, pg. 49
[122] Deloitte, Researchers' Report 2014 Country Profile: Greece, pg. 14
[123] Deloitte, Researchers' Report 2014 Country Profile: Greece, pg. 14
[124] http://library.certh.gr/pls/rmp/mobility.main, December 2014
[125] Deloitte, Researchers' Report 2014 Country Profile: Greece, pg. 8

In 2013, 80.7 of researcher posts per thousand researchers in the public sector were advertised through the Euraxess Jobs portal, compared to a EU27 average of 43.7. More than 1,900 research job vacancies were published on the Euraxess Jobs portal in 2012, compared to about 700 in 2011. Greece ranked sixth amongst the other EU countries publishing jobs on the Euraxess Jobs portal (51 countries in total)[126].

Based on statistics for the use of EURAXESS Greece in the period 2006-2014 , most popular questions related to research funding opportunities (2671 questions) and entry conditions/visa (1460 questions).

3.2.5 Doctoral training

According to Law 4009/2011 (Part IV) HEIs are free to develop their doctoral training programmes and may increase their quality through collaborations with national and foreign HEIs and RPOs[127].All programmes need, however, approval of the Ministry of Education and Religious Affairs. The authorisation is requested in order to ensure compliance with quality criteria but also make sure that programmes are not started and scrapped if the Ministry is unable to provide the funding individual departments are expecting. Hence the application-authorisation process is a matter of clarity and transparency. Graduate programmes that can be self-financed are not refused.

While the ERAC Mutual Learning Report lists Greece among the countries where researchers have sufficient demand from the non-academic sector, employers in SMEs and in different sectors of the economy very often appreciate the added value of a doctoral degree[128]. Doctoral training is appreciated as a means for securing employment outside HEIs but there are contradicting indications including labour market studies, the share of PhD holders working in the private sector and the share of PhDs emigrating, which may be based on a biased sample. Or maybe employers value PhDs in theory but are not employing them according to their qualifications.

The financial crisis in Greece has led to limited funding of doctoral training and almost no funding of post-doctoral research[129]. Many doctorate students are forced to work in parallel with the doctoral studies and this poses a constraint on their research activity[130]. In the National Technical University of Athens only 10% of doctorate students receive fellowships, while a considerable share of the others are funded by research contracts of their supervisors[131].

Some PhD programmes follow the principles of Innovative Doctoral Training (IDT) by coincidence while others comply implicitly with some of the seven principles[132]. No HEI has

[126] Deloitte, Researchers' Report 2014 Country Profile: Greece, pg. 9
[127] Deloitte, Researchers' Report 2014 Country Profile: Greece, pg. 10
[128] Report from the 2014 ERAC mutual learning workshop on Human Resources and Mobility, Intersectoral Mobility, Karen Vandevelde, Brussels, March 26, 2014
[129] European Commission DG RTD, Exploration of the implementation of the Principles for Innovative Doctoral Training in Europe, Final Report, pg. 24
[130] European Commission DG RTD, Exploration of the implementation of the Principles for Innovative Doctoral Training in Europe, Final Report, pg. 50
[131] European Commission DG RTD, Exploration of the implementation of the Principles for Innovative Doctoral Training in Europe, Final Report, pg. 53
[132] COMMISSION STAFF WORKING DOCUMENT. Snapshots Member States of the European Union Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT European Research Area Progress Report 2014 pg. 229

announced a formal adoption of the IDT principles at the institutional level. Funding and the lack of human resources are acknowledged as major barriers for the implementation of IDT[133].

3.2.6 HR strategy for researchers incorporating the Charter and Code

In October 2010, the 65th Conference on the Charter & Code encouraged all Greek higher education institutions to sign it and recognise it as the tool to promote their human resource strategies. Law 4009/2011 strongly promotes the 'Charter & Code' principles on excellence and innovation[134].

15 HEIs and research organisations of the public and private sector have endorsed the Charter and Code; the Aristotle University of Thessaloniki, Euroscience, Greek Rectors' Conference, Foundation for Research and Technology Hellas, Institute of Accelerating Systems and Applications, International Hellenic University, the Marie Curie Fellows Association, the National Hellenic Research Foundation, the University of Crete, the University of Ioannina, the University of Patras, the University of Thessaly, the University of Macedonia[135].

By May 2014, 9 organisations were involved in the Commission's Human Resources Strategy for Researchers (HRS4R) of which 2 (University of Crete and the Centre for Research and Technology Hellas associated to the University of Crete) have received the "HR Excellence in Research" logo for their progress in implementing the Charter & Code[136].

To summarise, the academic labour market in Greece follows open merit-based recruitment based procedures (although with lower transparency than in the past), with the involvement of foreign peers in evaluation committees. In terms of salaries, the market is unattractive and deteriorated further during the crisis. The Greek language is an additional barrier for foreign entrants.

3.2.7 Education and training systems

In Greece, about €280 million of Structural Funds (2007-2013) was spent on the development of human capital in the field of research and innovation, in particular through post-graduate studies and training of researchers, and networking activities between universities, research centres and businesses[137]. There are no specific policies in place or incentives to ensure a sufficient supply of postgraduates in the fields of science, technology, engineering and mathematics. On the contrary high shares are in SSHs.

Education and training curricula addressing transversal competences were promoted through the programmes Thales, and Archimedes III described above under chapter 2

[133] European Commission, DG RTD, Study Visit, Institution: National and Technical University of Athens, Country: Greece, Case study undertaken in the context of the 'Exploration of the implementation of the Principles for Innovative Doctoral Training in Europe' carried out by: Lena Tsipouri and Emmanuel Bodard, September 2013, pg. 14

[134] The Researchers Report 2012, Country Profile: Greece, Deloitte, 2011

[135] http://ec.europa.eu/euraxess/index.cfm/rights/charterAndCode#G, December 2014

[136] COMMISSION STAFF WORKING DOCUMENT. Snapshots Member States of the European Union Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT European Research Area Progress Report 2014 pg. 229

[137] Report of Mapping Exercise on Doctoral Training in Europe , "Towards a common approach" , 27 June 2011

(Research Programmes). Excellence in education is promoted through the programme ARISTEIA II described above under chapter 2 (Research Programmes).

Excellence is opposed by a number of student unions, who consider that cohesion is more important than excellence. In addition, because of the structure of the national system, which foresees a nationwide entry contest for entering higher education, exams take the form of uncritical learning and it gets very difficult to change this mentality later on.

Generalised innovation management courses are not adopted by institutions but they exist in individual curricula. Entrepreneurship education and training is ensured through the establishment of the Innovation Council and the R&I web platform (see above under chapter 2 Recent R&I Policy Initiatives), the innovation voucher scheme and Si-Cluster (see above under chapter 2 R&I funding) and the research programmes Collaboration, Creation and PAVET 2013 (see above under chapter 2 research programmes).

3.3 ERA priority 5: Optimal circulation and access to scientific knowledge

3.3.1 e-Infrastructures and researchers electronic identity

Greece participates in the following large international research infrastructures (RIs): European Space Agency (ESA), Conseil Européen pour la Recherche Nucléaire (CERN), European Fusion Development Agreement (EFDA), and European Molecular Biology Laboratory (EMBL). In 2012 (last available data), Greece contributed 2.2 % of GBAORD to the activities carried out by CERN, EMBL, the European Southern Observatory (ESO), the European Synchrotron Radiation Facility (ESRF), the Institut Laue-Langevin (ILL) and the European Commission's Joint Research Centre (JRC)[138].

In November 2014, there were 28 open access repositories operating in Greece, in 10 Universities, 2 research organisations, the NDC and the Hellenic Managing Authority of the Operational Programme "Education and Lifelong Learning". In total there were 21 institutional repositories[139].

The Greek Research and Technology Network (GRNET), national member of the National Research and Education Network (NREN), facilitates Computing and Cloud Services. GRNET coordinates, has developed and operates its own public IaaS cloud solution named Okeanos, offering cloud resources to the Greek Universities[140]. GRNET has signed cooperation agreements with core network ABILENE and the consortium of 200 US Universities for access and participation to Internet2 (a collaboration of research, academia, industry and government in innovative technologies)[141].

Greece ranks low (3.93) in Network Readiness Index published by WEF. The index ranks in a 1-7 scale, 144 countries according to four criteria: (1) the environment (political and regulatory, business and innovation), (2) readiness, i.e. infrastructure, affordability, and

[138] Eurostat- National public funding to transnationally coordinated R&D (gba_tncoor) http://epp.eurostat.ec.europa.eu/statistics_explained/index.php/R_%26_D_budget_statistics_-_transnationally_coordinated_research, December 2014

[139] http://www.opendoar.org/find.php?cID=84&title=Greece

[140] https://www.grnet.gr/, December 2014

[141] GRNET Annual Report pg. 11

skills, (3) the usage of individuals, business and government and (4) the social and economic impact[142].

There is no national policy on e-identity. However, GRNET cooperates with the Ministry of Education and Religious Affairs for the development of e-identity among researchers (funding from the OP Digital Convergence 01.07.2012-31.10.2015). In the period 2012-2013, e-identity was granted to 366,627 students while up until the end of December 2013 47,981 new students had received the e-identity[143]. Greece participates through GRNET in eduGain, a group of institutions and organisations using Authentication and Authorisation Infrastructures (AAIs) to build a trusted environment where users can be identified electronically using a single identity. More than 50% of RPOs provided in 2013 federated identities of their researchers[144].

There is no national strategy to address personal data security.

GRNET has launched in 2013 a programme for the development or/and upgrading of Catalogue Services and Authentication and Authorisation Services within HEIs and RPOs linked with GRNET for the safeguarding of personal data of the academic community while using their institutional account (funding from OP Education and Life-Long Learning)[145].

3.3.2 Open Access to publications and data

The debate for open access has developed actively in Greece in 2012 with initiatives taken mainly by the National Documentation Centre (NDC). The NDC plays the role of a national repository but is also actively encouraging national content creation. Its e-publishing facility is open to all Greek researchers wishing to join[146]. The larger HEIs subscribe to the major scientific journals and faculty members and students have access via the intranet of the institution. E-Journals are circulating, but remain marginal compared to traditional journals accessed via the web. In 2010, NDC signed the Alhambra Declaration for the enhancement of open access policies through the creation of national task force committees.

In April 2013, the Greek Open Knowledge Foundation Network (OKFN) was created, following an initiative from the Aristotle University of Thessaloniki. The Greek OKFN will focus on open linked data and aims to enhance governance of local research procedures, improve transparency and access to research, cultural and financial data[147].

In October 2014, NDC participated for the fourth year in international open access week[148]. Law 4305/2014 (Art. 33) introduced open access to all data published by the public sector.

NDC is a partner and leads the fifth work package of the Policy Recommendations for Open Access to Research Data in Europe (RECODE) project, related to the production of guidelines that identify, promote and disseminate open access policies. These guidelines will be incorporated into the final recommendations of the RECODE project[149].

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[142] Europe 2020 Themes: Digital Agenda: Broadband and E-communications, pg. 9
[143] GRNET Annual Report pg. 29-30
[144] European Research Area, Progress Report 2014, pg. 55
[145] GRNET Annual Report pg. 30
[146] http://epublishing.ekt.gr/el, December 2014
[147] http://gr.okfn.org, December 2014
[148] http://openaccess.gr/ekt_oa/oaweek/oaweek_2014.dot, December 2014
[149] http://recodeproject.eu/partners/, December 2014

The Action Plan of ESETAK calls for open access in all documents (information, publications, content) produced through public funding. Researchers funded by public funds must provide open access to their research material within 12 months from the publication of the ESETAK and make a digital copy of their research work available in thematic repositories acknowledged internationally in the science field where the research was conducted or in institutional open access repositories[150].

There are no funder open access mandates[151].

Greece supports gold and green open access to publications and a working group is in place[152]. The majority of open access papers in Greece in the period 2008-2013 were other type (3,067 papers, 72.2% of total OA papers and more than 38% of total accessed papers), based on a sample of accessed papers (8,043). Gold journals came second, accounting for 18.2% of OA papers and 9.6% of total accessed papers. OA papers were 52.8% of total[153].

According to the information in ROARMAP, two Greek institutions thus far have an explicit OA mandate (Panteion University and Archimedes Centre for Modeling, Analysis and Computation)[154]. About 85% of RPOs make frequently or occasionally available online and free of charge publicly funded scientific research data (2013)[155].

In a survey conducted by Science-Metrix using DOAJ, PubMedCentral, and Scopus regarding papers published on open access in the period 2008-2011 among EU 27 Member States, Greece ranked above average with over 100,000 records contained in institutional repositories[156]. In November 2014, the total number of records included in institutional repositories had exceeded 395,000 (Table 5).

Table 5: Documents included in the 21 institutional repositories.

Repository name	Num. Recs.	Pubs	Confs	Theses	Unpub	Other
ACMAC	239		+			
Acropolis Educational Resources Repository	260	+				+
Aristotle University of Thessaloniki Institutional Repository - IKEE	78.972	+	+	+		+
Aristotle University of Thessaloniki Repository - Psifiothiki	132.378	+		+		+
Digital Library of Modern Greek Studies	11.539	+				+
Digital Repository of Hellenic Managing Authority of the Operational Programme "Education and Lifelong Learning" (EDULLL)	1.197	+			+	+
Dione (Διώνη)	5.630			+		

[150] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 14
[151] Open Access Strategies in the European Research Area, August 2013, Science Metrix, pg. 3
[152] European Research Area, Progress Report 2014, pg. 43
[153] Proportion of Open Access Peer-Reviewed Papers published in Peer-Reviewed Journals at the European and World Levels 1996-2013, October 2014, Science Metrix, pg. 26
[154] http://roarmap.eprints.org/, December 2014
[155] European Research Area, Progress Report 2014, pg. 45-46
[156] Caruso J., Archambault A. and E., Open Access Strategies in the European Research Area, August 2013 produced for the European Commission DG Research & Innovation

Repository name	Num. Recs.	Pubs	Confs	Theses	Unpub	Other
DSpace at NTUA	38.835			+		+
E-Locus	5.353			+	+	
Educational Repository - University of Patras	40		+			+
ESTIA	2.393			+		
Eureka!	6.178	+			+	+
European Documentation Centers (Κέντρα Ευρωπαϊκής Τεκμηρίωσης)	716				+	
FOSS Repository	318		+			+
Grey Literature Digital Library at the National and Kapodistrian University of Athens	3.144			+		+
HELIOS Repository	6.544	+	+			+
Nemertes	7.686		+	+	+	
PANDEMOS	5.755	+	+	+		+
Pergamos Digital Library	74.907	+			+	+
Psepheda: Digital Library & Institutional Repository	12.749		+	+		+
SysSec Project Publications	174		+		+	+
TOTAL	**395.007**					

Source: http://www.opendoar.org/find.php

In 2009, there were 21 Greek open access scientific journals listed on DOAJ, compared to almost double the number of scientific journals that existed in Greece but were not listed on DOAJ[157]. At the end of 2014, there were 20 Greek open access scientific journals listed in DOAJ[158]

[157] Scholarly Publishing & Open Access in Greece, 2009 Report, commissioned by SELL (Southern European Libraries), pg. 14

[158] http://doaj.org/search?source=%7B"query":%7B"filtered":%7B"query":%7B"query_string":%7B"query":"Greece","default_field":"index.country","default_operator":"AND"%7D%7D,"filter":%7B"bool":%7B"must":%5B%7B"term":%7B"index.lah, December 2014

4. Innovation Union

4.1 Framework conditions

Framework conditions are not really favourable to R&I: autonomy is limited, the intervention of the state is often made with accounting rather than development criteria, the R&I policy cycle is not smooth with rationales, monitoring and evaluation suffering and financial incentives are occasionally mis-managed in their delivery.

The new RTDI Law 4310/2014 set up specific conditions for the enhancement of research and innovation and adopted the new national RTDI strategy (ESETAK). The Law amended the National Council for Research Technological Development and Innovation (NCRTDI) and introduced the Regional Research and Innovation Councils (described under par. 2.2 R&I structure) and provided the framework for the funding of spin offs for RTDI (Art. 26) and the award of innovation prizes to RPOs, HEIs, the business sector (Art. 27).

Policies are supply driven. Demand-side measures have as yet been only adopted in the form of consumer subsidisation for energy efficiency but this has only supported diffusion and no new technology creation. Demand-side policies in the form of public procurement for innovation are envisaged for the first time in the programming period 2014-2020.

4.2 Science-based entrepreneurship

HEIs and PROs (with the exception of FORTH) do not have an explicit spin off strategy. Presidential Decree 17/2001 provided the framework for the financing of spin-offs from HEI and RPOs. The Decree allowed HEIs to acquire equity stakes up to 50% in such enterprises and set up the framework for the establishment of licensing agreements between spin-offs, HEIs and RPOs, also authorising faculty members to own minority equity stakes in spin offs (Art. 11 of Law 2919/2001 and later amendments) [159]. Law 4310/2014 (Art.26) regulates conditions for funding of spin offs through equity, loans and guarantees against business losses. Law 4310/2014 (Art.21) introduced the framework for the commercialisation of research output through the participation in R&D start-ups, research collaborations, participation in activities of high business risks.

University-industry cooperation was supported by specific schemes in the 2007-2013 period and most of them are expected to be replicated in the same or similar mode (Cluster development and Cooperation). Supply-side infrastructure like Technology Transfer Offices (TTOs) and Regional Innovation Poles did not prove successful[160]. In 2013 and 2014 a number of initiatives was promoted from NGOs and business associations to encourage technology-based start-ups, Examples include Endeavour, the Hellenic-American Chamber and "Innovation Expert-Innovation in Action", INNOVATHENS and the signing of a partnership agreement between GSRT and HFE for RTDI, described under par. 2.2 (R&I policy initiatives).

Public funding is very scarce; hence the support of existing science and technology parks is at a minimum. Funding for incubators usually comes from Jeremie Funds and the private sector (section 2.5.2-other allocation mechanisms).

[159] Karra S., Tolias Y., Greek Universities and Knowledge Transfer Performance: Assessment, Implications and Prospects, Conference proceedings, September 28th 2012

[160] Information from interview, see interviewee list Annex 1b

Funding schemes targeted at young innovative companies are described in detail under research programmes (section 2.2 above) and include the 'Support for R&D in new firms' (2009-2015), New Innovative Entrepreneurship (2011-2015) and Creation (2009-2015). Furthermore, young companies are supported by the incubators described in detail under par. 2.5.2 above (Iqbility, EGG, Thea, etc.).

In November 2014, Greece hosted for the second time the international competition "Creative Business Cup", aiming to strengthen talented entrepreneurs and promote new and original ideas in creative industries[161].

4.3 Knowledge markets

Law 4310/2014 (Art.26) provides for the creation of a specialised office within GSRT, which will:

- Support RPOs in the filing of patent applications;
- Schedule training programmes of at least three years, in cooperation with foreign RPOs, in patent regulations and accreditation of respective graduates in patenting. The specifics of the programmes (curriculum, election criteria etc.) will be described by subsequent decision of the Minister of Education and Religious Affairs; and
- Promote the establishment of patent funds through collaboration between private and public sector.

Law 3842/2010 introduced tax exemptions for a period of three years of profits derived from patented products or services[162].

In February 2013, Greece signed the international agreement for the establishment of a Unified Patents Court, along with 24 other EU member states[163].

The Organisation of Industrial Property organises information and awareness raising events regarding the process and value of patenting.

4.4 Knowledge transfer and open innovation

In terms of the legal framework a number of laws and decrees have addressed the main issues that set the rules of collaboration: the Presidential Degree 274/2000 provided the framework for the financing of R&D projects of the industry sector by GSRT and was the first step towards cooperation between academia and the industry.

Several efforts have been made and funding opportunities are offered for the creation of industrial liaison offices in universities and public research organisations. The Law 4009/2011 acknowledged the creation of 'Innovation and Liaison Offices' within the legal entities responsible for allocating research funding to HEIs. ILO will support the registration of Intellectual Property Rights (IPR) of HEIs and their academic staff, will promote collaborations between academia and the industry, provide career orientation to students

[161] http://www.ekt.gr/content/display?ses_mode=rnd&ses_lang=el&prnbr=89608, December 2014
[162] Legislation on patenting, designs and prototypes for technology transfer, December 2014, Industrial Property Organisation, pg. 158
[163] http://ec.europa.eu/internal_market/indprop/patent/ratification/index_en.htm#fn1, December 2014

and graduates, organise internships for students, schedule seminars, lectures and mentorships for students and graduates in the fields of innovation and social networks and organize innovation and Entrepreneurship initiatives within the research community of HEIs (i.e. innovation awards).

Individual organisations like the National Documentation Centre (NDC) and the PRAXI/ HELP-FORWARD Network of the Foundation for Research and Technology Hellas (FORTH) support the development of research collaborations and exploitation of results between the public and private sector. NDC publishes on its website all important initiatives promoting research collaborations between HEIs, RPOs and enterprises[164]. The PRAXI/ HELP-FORWARD Network operates as a distinct entity under the auspices of FORTH with the support of HEF and the Federation of Industries of Northern Greece. It provides information, mediation and advisory services to all stages of Technology Transfer and Exploitation of Research Results (funding, detection of technological needs, technology search and evaluation, partner search and support in technology transfer negotiations)[165].

In terms of project funding, GSRT has launched a number of programmes; these programmes aim to enhance knowledge transfer between public and private sectors and include PAVET (2007- 2013), the Hellenic Mobile Cluster Programme (2013), Innovation Vouchers for SMEs (2009-2015), COOPERATION 2011, the Creation Programme (2007-2013) as well as through the action Supporting enterprises for recruiting high level scientific personnel (2007-2013)[166].

More recent activities include:

- The invitation for the Expression of Interest (EOI) launched by GSRT in September 2014 for the provision of services for the creation of a web R&I platform[167];
- The strategic partnership agreement for research, technology development and innovation signed between GSRT and the HFE in October 2014 for the establishment of an Innovation Development Network. [168]

Greece has set-up specialised National Research and Education Network dedicated to support the needs of the research and education communities. Within this context Greece supports collaboration and cloud services[169].

There are no mobility schemes encouraging academics to work in companies. On the contrary, the current legal framework imposes constraints on the employment of researchers by the private sector[170].In practice, researchers are not demanded very much by the industry on a professional basis. Based on the findings of a questionnaire circulated in the context of ERAC Mutual Learning Workshop on Human Resources and Mobility, academics in Greece very often have problems in finding jobs outside HEIs[171]. As

[164] http://www.ekt.gr/rtd-serv/cooper.htm, December 2014
[165] https://www.forth.gr/index_main.php?l=e&c=8, December 2014
[166] ERAWATCH Communication Fiche Greece 2013
[167] http://www.gsrt.gr/central.aspx?sId=110I458I1163I646I453967&olID=777&neID=589&neTa=1_937&ncID=0&neHC=0&tbid=0&lrID=2&oldUIID=aI777I0I119I428I1089I0I3&actionID=load, December 2014
[168] http://www.sev.org.gr/Uploads/pdf/keimenoProgrammatikisSymfonias.pdf, December 2014
[169] European Research Area, Progress Report 2014, pg. 64
[170] COMMISSION STAFF WORKING DOCUMENT, Snapshots Member States of the European Union Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE COUNCIL AND THE EUROPEAN PARLIAMENT European Research Area Progress Report 2014
[171] Intersectoral Mobility, Karen Vandevelde, Report from the 2014 ERAC mutual learning workshop on Human Resources and Mobility, Brussels, March 26, 2014

referenced in the ERA progress Report, within the ERA compliant cluster[172], the share of research personnel whose primary occupation is in the private sector (headcount) is equal to 0.

The results of open innovation and knowledge transfer policies cannot be easily assessed since there are no available statistics on invention disclosures. Information on patent applications filed by HEIs and RPOs are also scarce. In the period from 1996 to 2010, HEIs accounted only for 1.6% of total patent applications (155) and only 0.98% of total granted patents were granted to HEIs (55). HEI faculty members filed a large number of these patent applications and patents. In half of the cases the applications were filed by spin-off companies with faculty members as direct or proxy equity investors. In the period 2009-2011, 310 patent applications were filed by RPOs and 168 by HEIs. In the same period, there were 21 spin offs from RPOs and 27 from HEIs[173]. Only 6 HEIs have procedures in place to deal with invention disclosures and their subsequent assessments[174].

The Innovation Council in its first meeting in April 2014 prioritised the creation of Knowledge Transfer Offices (KTO) in all HEIs and RPOs[175]. About 98% of research funders (business, HEIs, RPOs) support occasionally the implementation of knowledge transfer as part of their institutional and/or project based funding compared to an EU-average of 82.9% (2013). About 64% of RPOs have KTO. More than 70% of RPOs have dedicated staff to knowledge transfer[176].

4.5 Innovation framework for SMEs

In Greece, there are no special rules in existing insolvency regulations for the support of the financial reorganisation of enterprises. Bankruptcy procedures have not yet been simplified[177], but they make a distinction between honest and fraudulent entrepreneurs. Special discharge proceedings exist and take on average 120 months. However, discharge proceedings do not protect entrepreneurs since any unsatisfied creditor can start new proceedings after the end of the liquidation period178. The revision of insolvency regulations is under way and establishment of insolvency courts is expected by 2017.

There are policies and instruments aiming to create a more favourable environment for SMEs, including the 'Support for R&D in groups of small and medium-sized enterprises (SMEs)' (2009-2015), Creation (2009-2015) and PAVET 2013 described in detail under chapter 2. An Innovation Voucher Scheme ran from September 2009 to 2012 and supported 286 projects. A new scheme is expected in the current programming period.

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[172] 22 RPOs in Greece answered the 2014 ERA survey, which represents 15.3% of the total number of researchers in the country (total number of researchers in the country as of 2011) -30.0 % of them are in the 'ERA compliant' cluster

[173] Data from WIPO Statistics Database (WIPO 2011) deducted from Karra S., Tolias Y., Greek Universities and Knowledge Transfer Performance: Assessment, Implications and Prospects, Conference proceedings, September 28th 2012

[174] Karra S., Tolias Y., Greek Universities and Knowledge Transfer Performance: Assessment, Implications and Prospects, Conference proceedings, September 28th 2012

[175] http://www.mindev.gov.gr/el/index.php/γραφειο-τυπου/δελτία-τύπου/2202-, December 2014

[176] European Research Area, Progress Report 2014, pg. 50 and 112, 113

[177] COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS , Review of the "Small Business Act" for Europe, 2011, pg. 5

[178] Bankruptcy and second chance for honest bankrupt entrepreneurs, Greece by Nikos Maroulis 2014

Endeavour Greece was established in September 2012 as a non-profit organisation, for the support of entrepreneurship in Greece (established businesses) through mentorship, strategic advice, inspiration and introduction to investors and markets. Single selection criterion is a solid turnover between € 500k-€15m. A Board of Directors composed of reputable Greek businessmen across a variety of industrial sectors manages the organisation[179]. The organisation supports 14 entrepreneurs from 9 companies[180]. Endeavour Greece is part of the global network Endeavour for the support of entrepreneurship[181].

Networking initiatives, which emerged in 2014, include:

- "Innovation Expert-Innovation in Action", an initiative of the Hellenic Federation of Enterprises (HFE) for the support innovation in Greek enterprises through networking and lectures. The objective was to include in the initiative 460 executives from 230 companies, irrespective of their sector, operating in the areas of Eastern Macedonia and Thrace, Ipeiros, Thessaly, Ionian Islands, Western Greece, Peloponnese, North Aegean, Crete, Central Macedonia and Attica. A total of 200 executives participated in the first round of the initiative (June-July 2014) and new trainings concluded in September-October 2014[182];
- In May 2014, INNOVATHENS was established. Six associations of 317 innovative companies[183] participated at the end of December in INNOVATHENS, while Samsung Electronics sponsored the initiative. The hub also cooperates with Innovation and Entrepreneurship departments of Greek HEIs[184]. INNOVATHENS is financed by structural funds (NSRF 2007-2013)[185];
- GSRT and the Hellenic Federation of Enterprises (HFE) signed a strategic partnership agreement for research, technology development and innovation. Under this agreement HFE undertook the responsibility to draft within two months (by December 2014) an action plan for the creation of an Innovation Development Network. The GSRT will be responsible for the promotion of this network, the establishment of research priorities and the design of financial tools for its funding. The Network will:
    - Provide technical support to enterprises for the development and enhancement of innovation strategies;
    - Outline their technological expertise and assist them in seeking the appropriate research support;
    - Ensure the appropriate networking with existing science and technology parks within the country;
    - Provide technology intermediation for the enabling of research agreements between RPOs and local businesses;

[179] http://endeavor.org.gr/en/mission2, December 2014
[180] http://endeavor.uberflip.com/i/414924, December 2014
[181] http://endeavor.org.gr/en/mission2, December 2014
[182] http://sev4enterprise.org.gr/, December 2014
[183] Hellenic Mobile Cluster, Hellenic Semiconductor Industry Association, Hellenic Biotechnology Association, Greek Association of Space Technology Industries and Hellenic Start-ups Association
[184] http://www.technopolis-athens.com/web/guest/innovathens/whoweare, December 2014
[185] http://www.ekt.gr/content/display?ses_mode=rnd&ses_lang=el&prnbr=89097, December 2014
http://www.innovathens.gr/innovathens/, December 2014

- Provide assistance to applications for financial support;
- Design and monitor common research initiatives between academia and the business community;
- Enhance international cooperation trough the participation in European technology platform and the cooperation with Enterprise European Network;
- Enable the creation of knowledge network for the technology transfer between academia and the business community;
- Promotion of web research platforms and
- Promotion of intersectoral initiatives of high added value in geographic areas with researchers of high calibre[186].

In March 2014 Si-cluster was established, an important innovation cluster in space technologies with the participation of Greek HEIs, businesses, start-ups and RPOs. Si-cluster is financed by GSRT and includes 13 innovative projects aiming to increase at national level sales by 47%, exports by 69%, private investments by 20%, R&D expenditure by 82% and patents by 68%[187].

ESETAK Action Plan places specific emphasis on the participation of SMEs and the enhancement of their RTDI potential. Within this context, measures for the promotion of business R&I investments, research collaborations between RPOs, HEIs and the business, social innovation, knowledge transfer, and networking are planned. Furthermore, ESETAK will be monitored and evaluated based on the quantitative and qualitative assessment of SME participation in R&I strategy[188]. Such evaluations are yet to come.

Innovation support, which has been thinly spread in the past, is expected to become more focused after the SSS will be agreed and implemented.

The creation of a position within the new government of Assistant Minister of Education and Religious Affairs with a focus on research and innovation is expected to enforce activities in this area (February 2015).

4.6 Venture capital markets

The recent financial crisis and the shortage of capital have minimised financing from venture capital (venture capital as % of GDP was practically equal to zero in 2012). Seed funding is usually provided through JEREMIE, as described above under section 2.5.3.

The angel market in Greece is the 6th smallest in the EU with €2.1 m of investments in 2013 and € 1.5 m in 2012. Average investment size per business angel is at about €40,300[189].

There are fiscal incentives for VCs; management fees of VCs are exempted from VAT, capital gains tax is at 20% compared to the Greek corporate tax rate of 26%.[190].

[186] http://www.sev.org.gr/Uploads/pdf/keimenoProgrammatikisSymfonias.pdf, December 2014
[187] http://www.ekt.gr/content/display?ses_mode=rnd&ses_lang=el&prnbr=88050, December 2014
[188] Action Plan for the implementation of ESETAK 2015-2021, September 2014, pg. 18-19
[189] EBAN: Statistics Compendium 2014
[190] EVCA Tax Benchmark Study 2012, June 2013

4.7 Innovative public procurement

In Greece, there are no explicit measures addressing public procurement for innovation. Unintentional impact of e-government procurement has supported ICT companies in the past and played the role of PPI.[191] In the period 2003-2012, Greece recorded below average improvement (less than 20% increase) in e-government compared to EU-27. In the same period, Greece recorded a below average share of new services introduced by public administrations, including the introduction of state-of-the art technologies and their diffusion, but ranked higher than EU27 average (24%) in terms of companies that sold their innovation to the public sector (about 28%).

Internal barriers delay or prevent innovation in public organisations, in line with other Eastern and Southern European countries (Bulgaria, Lithuania, Poland, Romania). Government procurement decisions are usually not fostering technological innovation, according to the perceptions of the business sector (score 3 on a scale of 1-7). In the EPSIS scorecard, Greece ranked above average in innovative services and innovative procurement[192].

Based on a survey conducted by the NDC in a sample of Greek companies[193] in the period 2010-2012, 81.8% of public contracts did not show any sign of innovative activity, only 6.2% of the contracts had innovation as a prerequisite and 11.9% of the contracts implemented innovative activities without being a prerequisite of the contract[194].

[191] Public Procurement for Innovation in Greece by Lena Tsipouri and Sophia Athanassopoulou, in "Public procurement, Innovation and Policy: International perspectives", 2013, edited by Kalvet, Tarmo, Kattel, Rainer and Lember, Veiko, Springer

[192] European Commission, European Public Sector Innovation Scoreboard, A pilot exercise 2013

[193] 14,987 Greek companies with employees>10 people from the industry and services sector

[194] Innovation in Greek companies 2010-2012, National Documentation Centre, 2015, pg. 37

5. Performance of the National Research and Innovation System

5.1 Performance of the National Research and Innovation system

Input indicators are in general low, with the exception of tertiary education graduates and number of researchers:

- Greece ranks fifth from the bottom in terms of R&D intensity among all EU member states. At the end of 2013, GERD was at €1.47b, increasing from 0.67% of GDP in 2011 to 0.8% of GDP in 2013.
- Business R&D expenditure is among the lowest in EU, 0.24% of GDP, compared to a EU28 average of 1.31% (2012 data); R&D expenditure in the public sector was somewhat higher 0.45% of GDP. There is no data per economic sector;
- At the end of 2011 (last available data), researchers accounted for about 0.92% of total active population compared to a EU28 average of 1.05%. In the same period, researchers accounted for 1.1% of total employment, compared to a EU28 average of 1.16%;
- New doctorate graduates per 1,000 population in Greece remain low at 1.1 in 2012, almost the same as in 2011 (1.2) compared to a EU28 average of 1.8;
- Greece benefits from a high percentage of population aged 25-64 years old with tertiary education (37.4% compared to an EU28 average of 28.5% at the end of 2013);
- International scientific co publications were at 590.2, almost 72% higher than the EU28 average (2012 last available data).
- Out of total product/process innovative companies 16% with innovation as core activity engaged in extra-mural R&D activities and 34% in intra-mural R&D activities in 2012. Out of total product/processes innovative companies 19% with manufacturing as core activity engaged in extra-mural R&D activities and 34% in intra-mural R&D activities in 2012 (Eurostat)195.

Latest available output indicators for the innovation activities of SMEs are rather old (2006 data) and are not helpful for drawing meaningful conclusions in an economy highly dominated by SMEs[196]. Other IUS output indicators suggest:

- 14.8% of employment is in fast growing firms of innovative sectors (2011 latest available data), compared to EU average of 16.2%;
- Contribution of high- and medium-tech products to the trade balance is negative from 2005 onwards (-5.4% at the end of 2013);
- License and patent revenues from abroad accounted for only 0.03% of GDP (2012 latest available data), compared to an EU average of 0.59%.

[195] Innovation in high-tech sectors (CIS 2008, CIS 2010, CIS 2012), EU Member States and selected countries [htec_cis6]

[196] The new CIS is completed and data publication is pending

From different sources one can conclude that:

- Publications have grown steadily from 1996 onwards, with a slight decrease by 5% in 2013. Total scientific documents in Greece reached almost 17,030 in 2013, compared to 17,980 in 2012 (5.2% decrease) and 17,592 in 2011[197].
- The main fields of publications are in Medicine (5,612), Engineering (2,428), Computer Science (2,051) and Biochemicals, Genetics and Molecular Biology (1,863), which accounted for more than 70% of all published documents[198].
- In spite of the growth, Greece ranks low in Western Europe, in terms of total citations per document (0.54) only above Luxembourg and Malta and the same as Cyprus[199]. At the end of 2013, Greece recorded 0.54 citations per document, compared to 2.66 citations per document in 2012 and 4.58 citations per document in 2011[200]. Total citations per document in the period 1996-2013 were at 13.40[201].
- Patenting under the PCT is very low; 0.37 patent applications per billion GDP (in million PPS) were filed under the PCT in 2010, 0.11 out of which in societal challenges[202]. At the end of 2012, there were 708 patent applications by residents, 28 by non-residents and 399 applications from abroad. In the period 1998-2012, patents concentrated in civil engineering (8.6% of total) and pharmaceuticals (7.6% of total);
- While statistics on applications to national patent office are not always comparable across countries, they can provide some indication of technological development activities that are not captured by EPO/PCT data. In Greece, approximately 590 patent applications were made at the EPO in the period 2000-2010. Approximately 985 patent applicants took the PCT route. The National Patent Office received over 2,270 applications in this period (these three figures are based on fractional counting)[203].

In terms of total innovation output, as measured by the index proposed by DG RTD measuring patent performance (IUS 2.3.1), employment in knowledge-intensive activities (IUS 3.2.1), contribution of medium-high and high-tech manufacturing to the trade balance (IUS 3.2.3) and a newly developed indicator on fast-growing firms in innovative sectors, Greece ranks below EU average with a score of 85 in 2010 and 2011[204].

In 2012, Greece produced on average 14.60 publications per 10,000 inhabitants, 5.8% above the EU-28 average (13.8). International orientation is average with 42.48% of publications internationally co-published. In 2012, Greece had 590 international scientific

[197] http://www.scimagojr.com/countrysearch.php?country=GR, 44.66% of international collaborations out of total documents (17, 029)
[198] http://www.scimagojr.com/countrysearch.php?country=GR, December 2014
[199] http://www.scimagojr.com/countryrank.php?area=0&category=0&region=Western+Europe&year=2013&order=it&min=0&min_type=it, December 2014
[200] http://www.scimagojr.com/countrysearch.php?country=GR, December 2014
[201] http://www.scimagojr.com/countrysearch.php?country=GR, December 2014
[202] ec.europa.eu/enterprise/policies/innovation/files/ius/ius-2014-database_en.xlsx, December 2014
[203] KU Leuven, Bocconi University, "Patents and Licensing study" for DG RTD – data release summer 2014.
[204] European Commission Memo, New Indicator of Innovation Output, September 2013
In 2011, the components reflect the situation in 2009 (patents), 2010 (jobs in fast growing firms) or 2011 (KIA, competitiveness). In 2010, they are based on 2008 (patents), 2009 (jobs in fast-growing firms) or 2010 (KIA, competitiveness) data.

co-publications per million population, compared to 1,066 international scientific co-publications per million population in Cyprus and 400 in Malta. In the period 2002-2012, 10.26% of the Greek scientific publications were in the top 10% most cited publications worldwide, almost the same as in the EU28 (Science Metrix, 2014)[205]. The share of public-private co-publications in Greece was only 1.4% in the period 2008-2013 against 2.8% for the EU28[206].

The economic impact of innovation in Greece (0.345) in the period 2010-2011 was slightly above its reference group (0.314) but well below the EU average (0.612)[207].

Table 6: Assessment of the Performance of the National Research and Innovation System.

1. ENABLERS	Year	EL	EU
Human resources			
New doctorate graduates (ISCED 6) per 1000 population aged 25-34	2011	1.10	1.70
Percentage population aged 30-34 having completed tertiary education	2012	30.90	35.80
Open, excellent and attractive research systems			
International scientific co-publications per million population	2012	590.22	343.15
Scientific publications among the top 10% most cited publications worldwide as % of total scientific publications of the country	2009	9.26	10.95
Finance and support			
R&D expenditure in the public sector as % of GDP	2012	0.45	0.75
Venture capital (early stage, expansion and replacement) as % of GDP	2012	0.00	0.08
2. FIRM ACTIVITIES			
R&D expenditure in the business sector as % of GDP	2012	0.24	1.31
Linkages and entrepreneurship			
Public-private co-publications per million population	2011	15.83	52.84
Intellectual assets			
PCT patent applications per billion GDP (in PPS€)	2010	0.37	3.92
PCT patent applications in societal challenges per billion GDP (in PPS€) (climate change mitigation; health)	2010	0.11	0.85
3. OUTPUTS			
Economic effects			
Contribution of medium and high-tech product exports to trade balance	2012	-5.41	1.27
Knowledge-intensive services exports as % total service exports	2011	N/A	45.26
License and patent revenues from abroad as % of GDP	2012	0.03	0.59

Source: European Commission, IUS Database (2014).

[205] These publication data are based on Elsevier's Scopus database. ScienceMetrix, Analysis and Regular Update of Bibliometric Indicators, study conducted for DG RTD. They represent an update of the data displayed in the table below. See also http://ec.europa.eu/research/innovation-union/index_en.cfm?pg=other-studies

[206] Scival 2014, Scopus based publication indicators derived from Elsevier's SciVal platform, www.scival.com last accessed December 2014.

[207] Research and Innovation Performance in EU Member States and Associated countries, Innovation Union progress at country level 2013, pg. 124

According to the Innovation Union Scoreboard 2014, Greece qualifies as moderate innovator[208] with a significant decrease in innovation performance (-6%) in the period 2010-2012[209], compared to a growth rate of 2.4% in the period 2006-2010[210].

At the end of 2013, the innovation index was at 0.384, compared to 0.380 in 2012 and 0.372 in 2011[211]. The highest performance was in innovators (0.56) and in human resources (0.52), while the lowest ranking was in intellectual assets (0.13) and in the finance and support dimension (0.17)[212].

Based on a survey conducted by NDC in a sample of Greek companies[213] in the period 2010-2012 total innovation expenditure was equal to € 1.9b. Greece ranked 11th among EU-28 countries with respect to total number of innovative companies as a percentage of total companies (52.3% compared to EU-28 average of 48.9%)[214]. Most of innovative companies came from manufacturing (industry sector) and IT and communications (services sector)[215]. Greece ranked 4th among EU-28 in terms of companies undertaking organisational and/or marketing innovation (45.4% compared to EU-28 average of 37.1%)[216].

Table 7: Assessment of the Performance of the National Research and Innovation System.

Feature	Assessment	Latest developments
1. Importance of the research and innovation policy	(-) Lack of coordination of R&D&I activities and public action in relevant policy areas is not implemented in strategic, coherent and integrated way (-) Funding is not focused on specific priorities. Grand challenges (Energy, Health and Environment) accounted for about 8% of GBAORD	(+) A new RTDI Law was adopted at the end of 2014 bringing changes to RTDI governance (+) The RIS3 is expected to improve strategic thinking and coordination with the private sector (+) The newly adopted R&I strategy ESETAK endorsed the smart specialisation areas (agro-food industry, tourism, life sciences, energy production and services, transport services and logistics, environmental sciences, IT and building materials)
2. Design and implementation of research and innovation policies	(-) Lack of coordination at the highest level between Ministries of Competitiveness, Education and Agriculture	(+) ESETAK and PA negotiations have put emphasis on the rationale of R&I policies (+)The creation by the new elected government of the position of Assistant Minister of Education and Religious Affairs entrusted with research and innovation is expected to enhance the role of the Ministry of Education in the coordination of the design and implementation of research and innovation policies.

[208] Innovation performance is below that of the EU average at relative performance rates between 50% and 90% of the EU average.
[209] Innovation Union Scoreboard 2013, pg. 14
[210] Innovation Union Scoreboard 2013, pg. 16
[211] Innovation Union Scoreboard 2014, pg. 92
[212] Innovation Union Scoreboard 2014, pg. 93
[213] 14,987 Greek companies with employees>10 people from the industry and services sector
[214] Innovation in Greek companies 2010-2012, National Documentation Centre, 2015, pg. 10
[215] Innovation in Greek companies 2010-2012, National Documentation Centre, 2015, pg. 13
[216] Innovation in Greek companies 2010-2012, National Documentation Centre, 2015, pg. 24

Feature	Assessment	Latest developments
3. Innovation policy	(+) There is active promotion of innovation and pre-announcements of support schemes were launched in 2014	(+) Establishment of an Innovation Council in December 2013 (+) Establishment of Regional Research and Innovation Councils (+) Innovation Voucher scheme running in the current programming period (+) Financing through JEREMIE funds (+) Fund raising by Institution for Growth through the creation of three sub funds
4. Intensity and predictability of the public investment in research and innovation	(-) The financial crisis has decreased public funding for education and RTDI (-) There are announcements that are never implemented; the previous Law on R&I was only partially enforced. The Innovation Fund created in 2012 did not get off the ground yet (-) Support schemes and time to contract are slow	(+) Regional Smart Specialisation Strategies propose a mixture of contracting out of programme management and public-private-partnerships (PPP) for future programmes (+)Public Private Partnerships (PPPs) will be explored in the context of the new EU Innovation Investment Package adopted in February 2014
5. Excellence as a key criterion for research and education policy	(-)The largest part of R&D public funding is channelled to universities and research centres in the form of path-dependent block grants (-) HEI and public research organisations suffer from central bureaucracies	(+) L.4115/2013 introduced provisions for the professional development of researchers and faculty (+) L.4310/2014 authorised research of up to 3 years (unpaid) to researchers for the commercialisation of their research ideas (+)Excellence in education is promoted through the programme ARISTEIA II (+) Steps towards the modernisation of university governance are visible
6. Education and training systems	(-) There is a shortage of human resources for research	(-) Salary reductions in HEIs and PROs were led to brain drain (-) Austerity measures deprived universities from faculty renewal; for every retirement there is one newly hired faculty member hence teacher/student ratios deteriorate (+) The Ministry of Education and Religious Affairs is encouraging the introduction of entrepreneurship courses in the university curricula, especially in the economics and engineering departments (+)Education and training curricula addressing

Feature	Assessment	Latest developments
		transversal competences promoted through the programmes Thales, and Archimedes III (+) Entrepreneurship education and training is ensured through the establishment of the Innovation Council and the R&I web platform, the innovation voucher scheme and Si-Cluster and the research programmes Collaboration, Creation and PAVET 2013
7. Partnerships between higher education institutes, research centres and businesses, at regional, national and international level	(+) There are clear rules on IP rights (+)There are no obstacles to setting up and operating transnational partnerships and collaborations (+)Greece participates in European Innovation Partnerships (EIP) on Agricultural Productivity and Sustainability, Active and Healthy Ageing, Raw Materials, Smart Cities and Communities and Water	(+) In the programming period 2014-2020, measures are foreseen for the enhancement of mobility of researchers between research centres and universities and the assurance of new recruitments of research staff. (+)The programme 'Career offer to Greek-speaking researchers from abroad' provides financial support in the form of grants to Greek speaking researchers from abroad (+) Law 4009/2011 enables national researchers to take a sabbatical leave for up to three years to participate in research projects abroad. An estimated 10% of researchers make use of this opportunity
8. Framework conditions promote business investment in R&D, entrepreneurship and innovation	(-)There is lack of awareness (and culture) of enterprises for the potential benefits of innovation (+) The rules for starting up and running a business are reported to be simplified. However, there are still complaints in the business world and the Task Force working on the modernisation of the Greek economy is working towards further improvements. (-) The financial crisis has deteriorated the business climate	(+) Law 4310/2014 (Art.26) provides for the creation of a specialised office within GSRT which will support patenting (+) Jeremie funds have created a new momentum in the market (even if of limited scale)
9. Public support to research and innovation in businesses is simple, easy to access, and high quality	(-) Bureaucracy is considered high for the allocation of competitive funding	(+) The Minister of Development and Competitiveness has announced the establishment of dedicated units within each Ministry for better coordination between the beneficiaries and the Managing Authorities

Feature	Assessment	Latest developments
10. The public sector itself is a driver of innovation	(-) In the period 2003-2012, Greece recorded below average improvement (less than 20% increase) in e-government compared to EU-27 (-) In the period 2003-2012, Greece recorded a below average share of new services introduced by public administrations, including the introduction of state-of-the art technologies and their diffusion (+) Greece ranked higher than EU-27 average (24%) in terms of companies that sold their innovation to the public sector (about 28%). (-) Internal barriers delay or prevent innovation in public organisations (-) Government procurement decisions are usually not fostering technological innovation (-)81.8% of public contracts did not show any sign of innovative activity in the period 2010-2012 (+)In the EPSIS scorecard, Greece ranked above average in innovative services and innovative procurement but this is incompatible with the other indicators mentioned above.	(+) E-platform for tenders became operational in November 2013

5.2 Structural challenges of the national R&I system

The national innovation system is characterised by lack of business demand for new knowledge and focus on R&D, lack of funding, low demand for researchers, inefficient governance mechanisms and an imbalanced development of innovation priorities at a regional level. These challenges are aggravated by the financial crisis that has shifted focus from R&D to other sectors that appear more central to stimulate growth in the near term. The five structural challenges are analysed below.

Lack of business demand for new knowledge

All R&D and innovation performance indicators related to the business sector have remained well below the EU-28 average. BERD as a percentage of GDP was at 0.27 at the end of 2013, compared to 0.24 in 2012, and slightly over 20% of the EU-28 average (1.3%)[217]. In terms of innovation output, Greece ranks below EU average with a score below 90 in 2010 and 2011[218].

The demand for research-based knowledge from the private sector has remained very low even in sectors with relatively high innovation performance; the latter focusing their innovation efforts mainly on non-R&D and non-technological aspects such as marketing and organisational improvements. The low share of manufacturing (just below 10% of GDP), and the financial turmoil that has reduced liquidity and has affected the business sector severely, are both likely to further reduce research-based innovation. The situation is aggravated by the crisis and the reduced liquidity of the banking sector, which has directly affected all businesses. RTDI expenditure is among the first to be reduced.

With limited and reducing demand for R&D a major challenge for public policy is:

- To create a stable macro-economic environment that will trigger investments in technology that need a longer term horizon to amortise and
- To eliminate factors that hamper innovation/entrepreneurship (such as removing bureaucracy that turns away SMEs), and attract ambitious companies, minimising crowding out.

Ensure better-focused and long term public funding of R&D, and facilitate access to funding of SMEs

Funding depends on Structural Funds and efforts of absorption dominate. Combined with the crisis R&I funding is more oriented towards solving liquidity problems than to addressing R&I performance and long-term challenges.

As the design and management of the Structural Funds is complex and the management capacity of the Greek administration is limited, the dependence on Structural Funds has resulted to fragmented planning and budgets being allocated to various sectoral and regional Operational Programmes. In addition, absorption rather than impact is in general the dominant funding criterion. This leads to a vicious circle between chasing funds and neglecting priorities. For years the lack of priorities and the scarcity of public funding have created an opportunistic supply driven research system (Bartzokas, 2007). This system often followed the priorities of the EU Framework Programmes (Grant et al, 2011), which were not always related to the needs of the country. Even worse, lack of focus hindered the creation of economies of scale of national relevance and importance in research areas (Grant et al, 2011).

Access to finance was reported to be the most pressing problem for 42% of Greek SMEs[219], which reported the highest increase in their needs for financing (30%)[220] in the euro area.

[217] Eurostat, Total intramural R&D expenditure (GERD) by sectors of performance

[218] European Commission Memo, New Indicator of Innovation Output, September 2013
In 2011, the components reflect the situation in 2009 (patents), 2010 (jobs in fast growing firms) or 2011 (KIA, competitiveness). In 2010, they are based on 2008 (patents), 2009 (jobs in fast-growing firms) or 2010 (KIA, competitiveness) data.

[219] European Central Bank, Survey on the access to finance of small and medium-sized enterprises in the euro area, October 2013 to March 20142014 / April 2014, pg. 4

The lack of liquidity of the banking sector resulted to only 15% of the SMEs applying for bank loans[221].

The current debt crisis and the severe budget cuts increase the importance of consolidated and targeted funding towards few and well-defined priority areas.

Align supply and demand of human resources

According to Lianos (2007) and Lambrianidis (2011), there is a mismatch between supply and demand of human resources. This misalignment can be attributed to both the insufficient demand of R&D from the private sector and the non-responsiveness of the education system to the market needs. Lambrianidis (2011) argues that the overabundance of highly educated individuals relative to the overall demand is due to the low demand from the private sector for highly qualified personnel.

Supply of skilled and medium-skilled labour increased more rapidly than demand in the decade 2000-2010 and it is expected to further increase more rapidly than demand in the current decade. A deceleration of demand, and to a lesser extent supply, for highly/medium skilled employees is expected in the period 2010-2020[222].

Most of R&D personnel are employed in the areas of Engineering and Technology (33.6% of total), followed by Social Sciences and Humanities (27.1% of total) and Medical and Health Sciences (20.1% of total)[223]. At the same time, top area in terms of R&D expenditure is Engineering and technology (38.6% of total), followed by Medical and Health Sciences (25.4% of total) and Social Sciences and Humanities (18.5% of total)[224].

The challenge for public policy is to increase the responsiveness of the higher education system to the needs of the economy and to increase the demand from the private sector for highly qualified personnel.

Improve governance of the national innovation system

The lack of efficient monitoring mechanisms and of systematic evaluation has hindered policy learning and did not allow improvements in the design and implementation of policies. Most striking was the total lack of systematic surveys until 2013, leading to lack of evidence to support effective policy-making.

Despite the urgent need for improvements at all levels of governance, budget cuts and reductions of personnel represent disincentives for improvement, while at the same time tensions within the existing organisational structures increase.

The concentration of design and implementation of the R&D policy within a single agent (GSRT) has been repeatedly criticised (Tsipouri and Papadakou, 2005). Furthermore, the positioning of GSRT within the auspices of the Ministry of Education and Religious Affairs makes the coordination of innovation policies with other bodies and Ministries difficult.

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[220] European Central Bank, Survey on the access to finance of small and medium-sized enterprises in the euro area, October 2013 to March 20142014 / April 2014., pg. 8

[221] European Central Bank, Survey on the access to finance of small and medium-sized enterprises in the euro area, October 2013 to March 20142014 / April 2014., pg. 15

[222] Innovation Union Competitiveness Report 2013, pg. 64

[223] Eurostat 2011 data, Total R&D personnel and researchers by sectors of performance, sex and fields of science

[224] Eurostat 2011 data, Total intramural R&D expenditure (GERD) by sectors of performance and fields of science

At the operational level, complex administrative rules, inefficient management structures, and low administrative capacity inhibit the consistency of competitive funding. Grant et al (2011) list several cases where funding decisions were delayed or committed research funds were not paid on time. As a result, competitive funding for the period 2007-2008 was virtually zero (Maroulis, 2011).

Reduce regional disparities in R&D and innovation performance

Greece presents large disparities among its regions both at economic and at R&D level. Unemployment rate is the highest in Western Macedonia (31.6%), followed by Central Macedonia (30.2%). Peloponnese (21.9%) and Ionian Islands (18.1%) have the lowest unemployment rates (2013 data)[225]. The existence of disparities presents a problem in research and innovation policy since some regions may not be able to undertake appropriate actions although acknowledged as areas with competitive advantages by RIS3 (i.e. Western and Central Macedonia for agriculture, some island of Northern Aegean for tourism etc.).

Attica has the highest population with tertiary education (35.2%), followed by Northern Aegean (27.4%) and Central Macedonia (27.1%), against an average of 27.4% for Greece. The Ionian Islands have the lowest population with tertiary education (17%, 2013 data)[226]. In terms of R&D personnel, Crete and North Aegean come first with 2.2% and 2.09%, respectively of R&D population to total active population. Attica has 1.54% of R&D personnel, slightly above the Greek average of 1.41%, while Ionian Islands (18.1%) have the smallest percentage of R&D personnel to total (0.23%) (2011 last available data)[227].

In terms of R&D expenditure, Attica has the highest GERD per capita expenditure of €194.1, followed by Crete (€169.2) and Ipeiros (€110.7) compared to a Greek average of €125.1 and the lowest GERD per capital expenditure of € 13.9 recorded in Ionian Islands (2011 last available data)[228].

In terms of innovation, things are improving and all Greek regions seem now to converge and qualify as moderate innovators[229]. Based on a survey conducted by the National Documentation Centre in a sample of Greek companies[230] in the period 2010-2012, Crete records the highest number of innovative companies as a percentage of total companies (65.2%), followed by Sterea Ellada (56%), Attika (54.3%) and the Region of Central Macedonia (53%)[231].

In terms of EU funding, Attica and Central Macedonia received the bulk of funding in the period 2007-2013. Limited funding was received by Ionian Islands[232].

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[225] Eurostat, Unemployment rates at the age group 25-64 years old by sex, age and NUTS 2 regions (%) (lfst_r_lfu3rt)

[226] Eurostat, Persons aged 25-64 with tertiary education attainment, by sex and NUTS 2 regions (from 2000 onwards) - % (edat_lfse_11)

[227] Eurostat, Total R&D personnel and researchers by sectors of performance, sex and NUTS 2 regions (rd_p_persreg)

[228] Eurostat, Total intramural R&D expenditure (GERD) by sectors of performance and NUTS 2 regions (rd_e_gerdreg)

[229] European Commission, Regional Innovation Scoreboard 2014, pg. 47

[230] 14,987 Greek companies with employees>10 people from the industry and services sector

[231] Innovation in Greek companies 2010-2012, National Documentation Centre, 2015, pg. 11

[232] Expert evaluation network delivering policy analysis on the performance of Cohesion policy 2007-2013, Year 3 – 2013, Task 2: Country Report on Achievements of Cohesion policy, Greece

Table 8: Summary table of key structural challenges.

Challenges	Justification
1. Increase business demand for new knowledge	- Low BERD/GDP ratio slightly over 20% of the EU28 average - Innovation output at 90 below EU average
2. Ensure better-focused and long term public funding of R&D	- Funds from abroad provide over 13% of total R&D funding - Absorption rather than impact is in general the dominant funding criterion - Access to finance was reported to be the most pressing problem for 42% of Greek SMEs
3. Align supply and demand of human resources	- Supply of skilled and medium-skilled labour increased more rapidly than demand in the decade 2000-2010 and it is expected to further increase more rapidly than demand in the current decade. - A deceleration of demand, and to a lesser extent supply, for highly/medium skilled employees is expected in the period 2010-2020
4. Improve governance of the national innovation system	- Lack of efficient monitoring mechanisms and of systematic evaluation - Lack of systematic surveys until 2013 - At the operational level, complex administrative rules, inefficient management structures, and low administrative capacity
5. Reduce regional disparities in R&D performance	- Attica has the highest GERD per capita expenditure followed by Crete and Ipeiros - Attica and Central Macedonia received the bulk of EU funding in the period 2007-2013

5.3 Meeting structural challenges

The five major challenges identified are recognised by the government and are increasingly addressed, with primary focus on competitiveness and entrepreneurship.

Increase business demand for new knowledge

Supply and demand-side policies co-evolve through the implementation of initiatives such as the "Innovation Expert-Innovation in Action", INNOVATHENS and the signing of a partnership agreement between GSRT and HFE for RTDI.

In addition there is a surge of incubators funded mostly by the private sector, with the exception of Thea, the incubator launched by the Athens Chamber of Commerce and Industry. Other related programmes in the current programming period include 'Support for R&D in new firms' (2009-2015), New Innovative Entrepreneurship (2011-2015) and Creation (2009-2015).

The success of these programmes will ultimately depend on the improvement of the macroeconomic climate in Greece and the enhancement of the liquidity of the Greek banking sector which will be called to provide matching funds.

Furthermore, Law 4310/2014 (Art.26) provides for the creation of a specialised office within GSRT which will support patenting. The same Law 4310/2014 (Art. 28) introduced leaves of researchers for the commercialisation of their research ideas. The new role of the

Assistant Minister of Education and Religious Affairs in research and innovation is expected to generate new ideas for the design of RDI policy in the period 2014-2020.

Ensure better-focused and long term public funding of R&D

In order to ensure better-focused of public funding of R&D, the Greek government considered the findings of studies conducted by McKinsey and the Foundation of Economic and Industrial Research on entrepreneurship, competitiveness and extroversion in Greece and set up the priorities of the new NSRF (2014-2020) in areas where Greece has a comparative advantage, namely Tourism, the Agricultural sector, Logistics, Environmental industry, Health , Energy production and savings, materials, ICT and Creative industries and Culture. McKinsey estimates that a total investment of about €110b in these sectors could have an added value of €48b and create 640,000 new jobs by 2020[233].

The same sectors were endorsed by ESETAK adopted through the new RTDI Law 4310/2014 and are further elaborated through the preparation of the National and regional Smart Specialisation Strategies.

The restructuring and consolidation of public research organisations and HEIs that is already underway though the ATHENA plan is also intended to enhance R&D in focused areas.

The success of these initiatives will depend largely on the mobilisation of the Regional Research and Innovation Councils (RRIC) created by Law 4310/2014 and the role that they will undertake in the design of RDI policy through their liaisons with GSRT. The governance schemes of the Smart Specialisation Strategy and the role of the new Alternate Minister for Research and Innovation will also be decisive.

Align supply and demand of human resources

The misalignment in skilled employment has widened because of the massive unemployment-affecting graduates, in particular young ones. Research brain drain has increased in the last two years, because of the crisis, and is expected to increase further, as in 2013 the salary reductions in HEIs and PROs were fully implemented.

The ATHENA plan is expected to reduce the misalignment of skills; however, as long as there is no real decentralisation and the Ministry of Education and Religious Affairs continues to impose quotas in all departments across the country, improvements are unlikely.

The Ministry of Education and Religious Affairs is encouraging the introduction of entrepreneurship courses in the university curricula, especially in the economics and engineering departments. In addition, offices are established in universities and polytechnics (€101m) that combine career development counselling activities with the promotion of business planning competitions, creation of entrepreneurship clubs, and development of courses on entrepreneurship. Law 4009/11 foresees that these offices will become an official unit within the institutional organogramme.

Law 4009/2011 (Art 2011) introduced the idea of scientific leaves enabling researchers to engage in research abroad for one year if researchers have been employed for a period of at least 6 years or 6 months for a total employment of at least 3 years.

[233] New NSRF, (2014-2020), Priorities and Architecture, Ministry of Development and Competitiveness, December 9th 2013

These initiatives are expected to increase the supply of specialised human resources. At the same time the crisis has decreased demand, hence the gap between demand and supply is diminishing.

Improve the governance of the national innovation system

A number of initiatives were undertaken by the government at the end of 2013 to improve the governance of the national innovation system:

- Systematic surveying and publication of RTDI data was organised for the future
- An Innovation Council was established in December 2013, with the joint participation of academics and the industry, as an advisory and coordinating body for the promotion of innovation policy. The Council will recommend innovative measures to the government and will act as a contact point between the businesses and the scientific community and the government[234].

However, Innovation Council did not pick up.

Law 4310/2014 introduced a new R&I structure, with a RTDI Coordinating Committee between the government, GSRT and NCRTDI for the monitoring and coordination of all R&D government efforts. The law foresees also the support of GSRT by Disciplinary Science Councils (DSC). The same law created the National Council of Research and Innovation.

The new role of Assistant Minister of Education and Religious Affairs entrusted with RDI policy will also provide better orientation and focus.

Finally, changes were introduced to the funding mechanism of NSRF in the new programming period (2014-2020)[235].

Evaluation remains a significant weakness: the only evaluation launched in recent years by the GSRT started in 2014 and results are not expected until mid-2015.

Reduce regional disparities in R&D and innovation performance

The Ministry of Education and Religious Affairs has defined Zones of Educational Priority (ZEP) in areas with low total education indicator, high school drop-outs percentages and low university accession percentages, as well as low socioeconomic indicators. In ZEP initiatives will be undertaken for the enhancement of the learning curve of pupils (i.e. summer courses, reception courses, lessons in the mother language of the pupils when foreigners)[236].

Regional Smart Specialisation Strategies for the 13 regions were prepared by a team of international and Greek experts and were released in September 2013, identifying research priorities for each region, taking into account a comprehensive analysis of the regional innovation landscape (SWOT analysis).

In preparation of the new programming period 2014-2020, measures are examined to enhance the demand of research and innovation services by Regional Authorities, as well as to boost the role of the research centers in regional development[237]. The new NSRF (2014-2020) foresees 13 Regional Operational Programmes and the management of 35%

[234] http://www.mindev.gov.gr/?p=13184, December 2014
[235] http://www.mindev.gov.gr/?p=13166, December 2014
[236] Greek National Reforms Programme, April 2013, Ministry of Finance, pg. 26
[237] Greek National Reforms Programme, April 2013, Ministry of Finance, pg. 52

of total funds by Regional Authorities, compared to 22% in the former programming period[238]. The new R&I structure foresees also the support of GSRT by RRIC.

[238] New NSRF, (2014-2020), Priorities and Architecture, Ministry of Development and Competitiveness, December 9th 2013

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Annex 1b – Interviews

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Annex 2 – Abbreviations

BERD	Business Expenditures for Research and Development	-
CERN	European Organisation for Nuclear Research	-
ERA	European Research Area	-
COST	European Cooperation in Science and Technology	-
DSC	Disciplinary Science Councils	Επιστημονικά Τομεακά Συμβούλια
ERA-NET	European Research Area Network	-
ERP Fund	European Recovery Programme Fund	-
ESA	European Space Agency	-
ESFRI	European Strategy Forum on Research Infrastructures	-
ERC	European Research Council	-
ESETAK	Technological Development and Innovation	Εθνική Στρατηγική Έρευνας, Τεχνολογικής Ανάπτυξης και Καινοτομίας
ETEAN	Hellenic Fund for Entrepreneurship & Development	Εθνικό Ταμείο Επιχειρηματικότητας και Ανάπτυξης
EU-28	European Union including 27 Member States	Ευρωπαϊκή Ένωση 28 Χωρών Μελών
FDI	Foreign Direct Investments	Άμεσες Ξένες Επενδύσεις
FP7	7th Framework Programme	7ο Πρόγραμμα Πλαίσιο
GBAORD	Government Budget Appropriations or Outlays on R&D	-
GCI	Global Competitiveness Index	-
GDP	Gross Domestic Product	Ακαθάριστο Εθνικό Προϊόν
GERD	Gross Domestic Expenditure on R&D	Ακαθάριστη Εγχώρια Δαπάνη Έρευνας και Τεχνολογικής Ανάπτυξης
GOVERD	Government Intramural Expenditure on R&D	-
GRNET	Greek Research and Technology Network	Εθνικό Δίκτυο Έρευνας και Τεχνολογίας
GSRT	General Secretariat of Research and Technology	Γενική Γραμματεία Έρευνας και Τεχνολογίας
GUF	General University Funds	-
HEI	Higher education institutions	Ανώτερα Εκπαιδευτικά Ιδρύματα
HERD	Higher Education Expenditure on R&D	Δαπάνη Έρευνας και Τεχνολογίας Ανώτερων Εκπαιδευτικών Ιδρυμάτων
HFE	Hellenic Federation of Enterprises	Σύνδεσμος Ελληνικών Βιομηχανιών
HQAA	Hellenic Quality Assurance and Accreditation Agency	Αρχή Διασφάλισης και Πιστοποίησης Ποιότητας στην Ανώτατη Εκπαίδευση
IfG	Institution for Growth	Ελληνικό Επενδυτικό Ταμείο
ILO	Innovation and Liaison Offices	Γραφεία Διασύνδεσης και Καινοτομίας
IP	Intellectual Property	Πνευματική Ιδιοκτησία
JRC	Joint Research Centre	-
KTO	Knowledge Transfer Office	Γραφεία Μεταφοράς Τεχνογνωσίας
NAGREF	National Agricultural Research Foundation	Εθνικό Ίδρυμα Αγροτικής Έρευνας
NCRT	National Council for Research and Technology	Εθνικό Συμβούλιο Έρευνας και Τεχνολογίας
NCRTDI	National Council for Research. Technology Development and Innovation	Εθνικό Συμβούλιο Έρευνας. Τεχνολογικής Ανάπτυξης και Καινοτομίας
NDC	National Documentation Centre	Εθνικό Κέντρο Τεκμηρίωσης
NSRF	National Strategic Reference Framework	Εθνικό Στρατηγικό Πλαίσιο Αναφοράς
OECD	Organisation for Economic Co-operation and Development	Οργανισμός Οικονομικής Συνεργασίας και Ανάπτυξης
PA	Partnership Agreement	Σύμφωνο Εταιρικής Σχέσης

PIP	Public Investment Programme	2. Πρόγραμμα Δημοσίων Επενδύσεων
PPP	Public Private Partnership	Συμπράξεις Δημόσιου-Ιδιωτικού Τομέα
PRO	Public Research Organisations	Κρατικά Ερευνητικά Ιδρύματα
PSCTA	Permanent Special Committee on Technology Assessment	Μόνιμη Ειδική Επιτροπή Τεχνολογικής Αξιολόγησης
R&D	Research and Development	Έρευνα και Ανάπτυξη
RPO	Research Performing Organisations	Ερευνητικά Ιδρύματα
RRIC	Regional Research and Innovation Councils	Περιφερειακά Συμβούλια Έρευνας και Καινοτομίας
RTDI	Research Technological Development and Innovation	Έρευνα. Τεχνολογική Ανάπτυξη και Καινοτομία
SF	Structural Funds	Κεφάλαια Διαρθωτικών Ταμείων
SME	Small and Medium Sized Enterprise	Μικρομεσαίες Επιχειρήσεις
S&T	Science and Technology	Έρευνα και Τεχνολογία
TEI	Technical Education Institutions	Τεχνολογικά Εκαπιδευτικά Ιδρύματα
UAT	University Autonomous Tool	-
VC	Venture Capital	Κεφάλαια Επιχειρηματικών Συμμετοχών

Annex 3 – R&I by sources of funding 2014-2020

Year	State (Ordinary Budget and Public Investment Budget excluding Structural Funds) € million	Structural Funds € million	Enterprises € million	EC FPs € million	Other national sources of funding (Non for profit organisations. own funds) € million	Other sources of funding from abroad € million	Total funding € million
2014	313.7	316.7	267.8	144.5	90.0	9.0	1.141.8
2015	316.0	260.0	281.2	146.9	90.0	10.0	1.104.2
2016	324.1	184.8	303.7	149.2	100.0	11.0	1.072.8
2017	333.8	277.1	329.5	151.2	100.0	11.0	1.202.8
2018	347.3	351.1	359.3	153.3	110.0	12.0	1.332.7
2019	364.6	388.1	393.3	155.0	110.0	13.0	1.423.9
2020	386.5	406.6	432.6	156.7	120.0	14.0	1.516.4
	2.386.0	**2.184.4**	**2.367.4**	**1.056.8**	**720.0**	**80.0**	**8.794.6**

Source: National Strategic Framework for Research and Innovation 2014-2020. National Council of Research and Technology

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